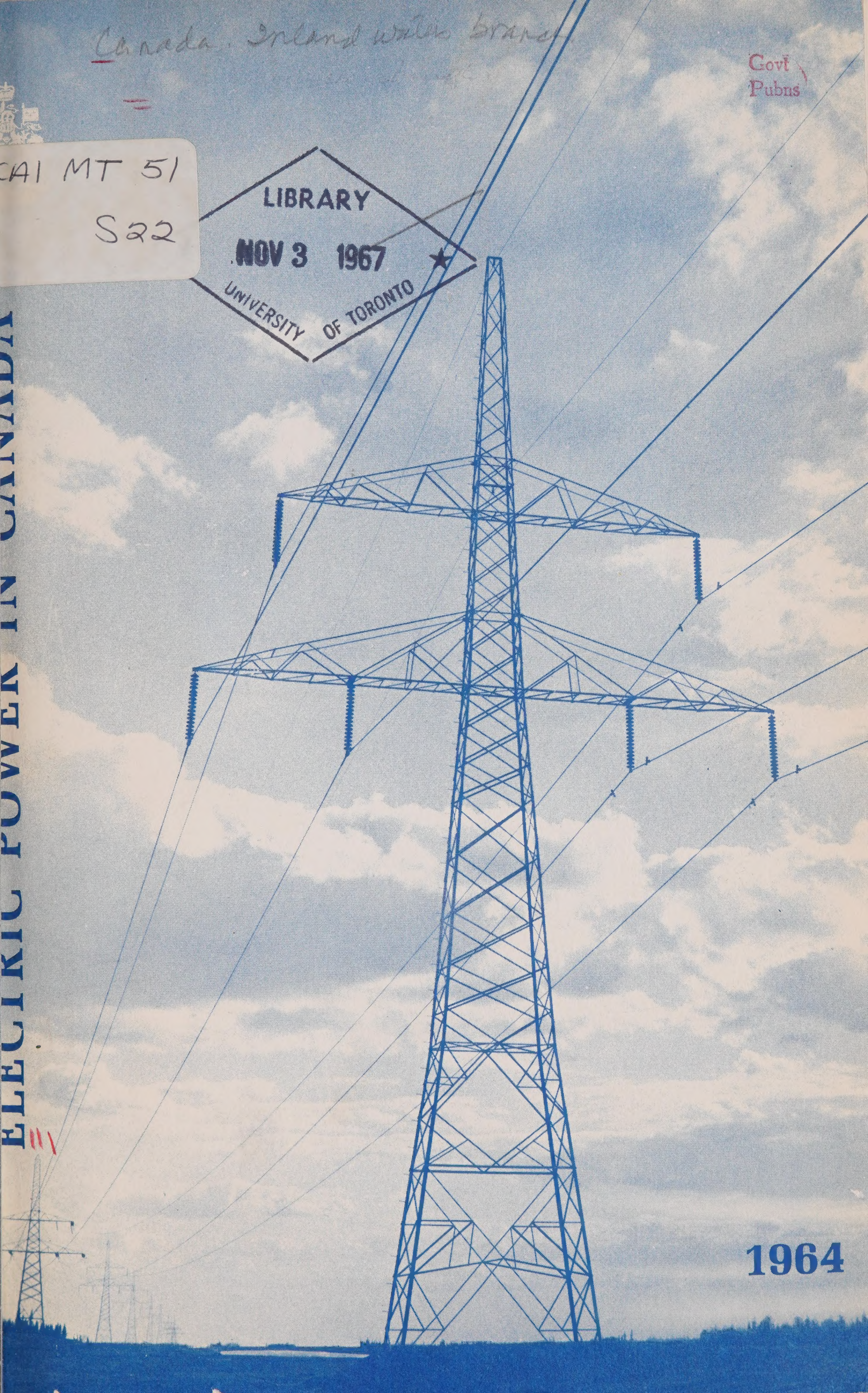
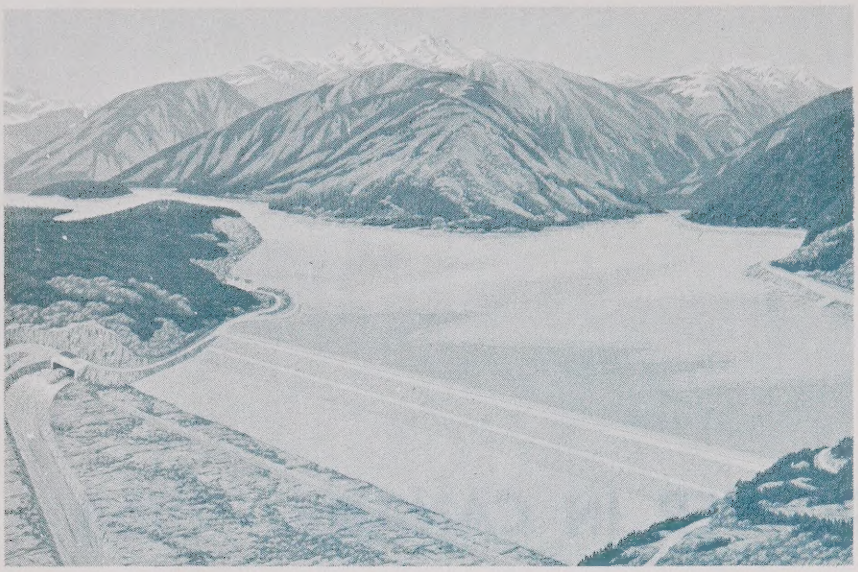
ELECTRIC POWER IN CANADA



1964

ELECTRIC POWER IN CANADA - 1964



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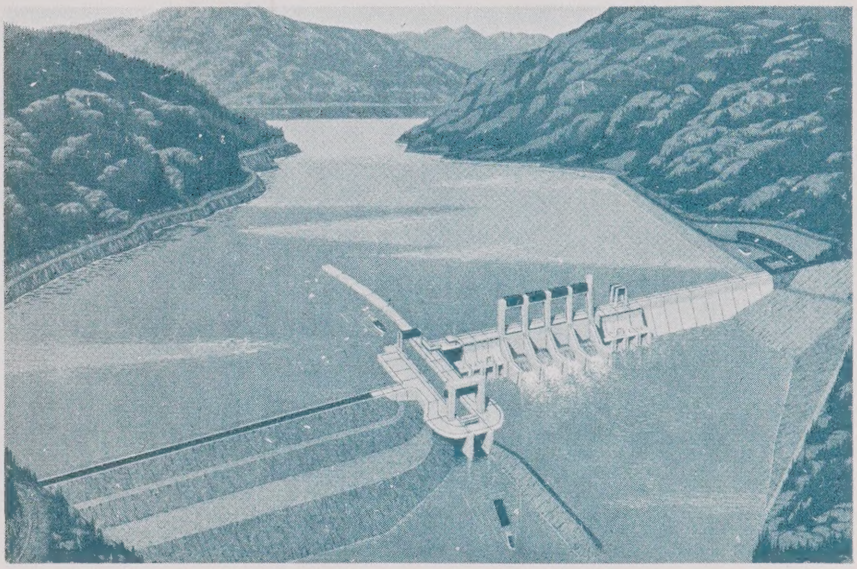

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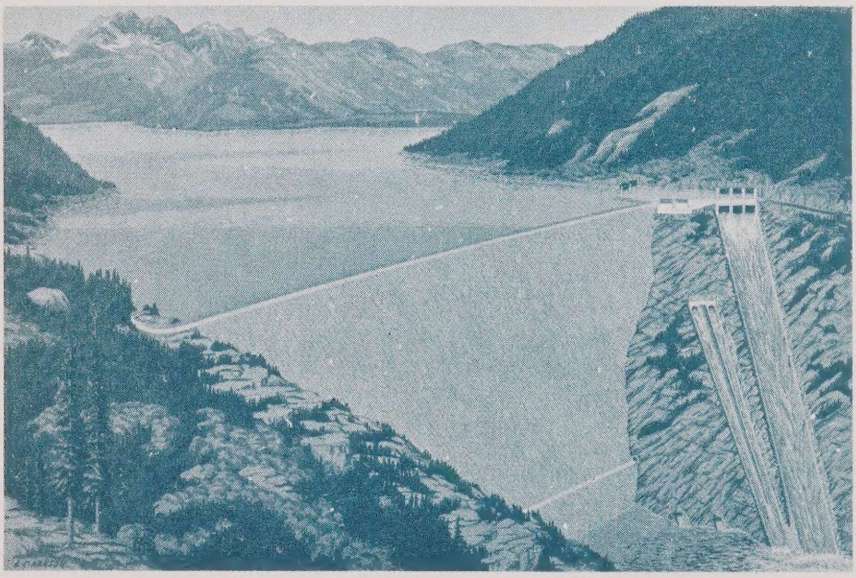

MICA

COLUMBIA RIVER TREATY STORAGE DAMS — Artist's conception

ELECTRIC POWER IN CANADA · 1964

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
WATER RESOURCES BRANCH

ROGER DUHAMEL, F.R.S.C.
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PREFACE

"Electric Power in Canada" combines under one cover the material formerly published in the three annual Water Resources Branch bulletins 2720, "Development of Electric Power in Canada", 2721, "Water Power Resources of Canada" and 2722, "Principal Power Developments in Canada".

"Electric Power in Canada" presents a general outline of the history of power development in Canada and discusses briefly the availability and distribution of water power and fuel resources. Also presented is a report in detail on progress during 1964 in the development and planning of new power generating facilities and a list of hydro and thermal generating stations with minimum installed generating capacities not less than 1,500 kw.

The Branch acknowledges with thanks the co-operation of the power-producing agencies in every province in Canada in making available the information used in the preparation of this publication. The Branch is indebted also to the Dominion Bureau of Statistics with whom close liaison has been maintained in the collection of information on existing power development.

The map inside the back cover shows main transmission systems and electric power generating stations in Canada.

A series of maps showing similar information in greater detail will be available in mid-1965 for the following regions:

1. British Columbia, Yukon Territory and Northwest Territories
2. Alberta, Saskatchewan and Manitoba
3. Ontario
4. Québec
5. New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland

These maps will be available from:

Director
Water Resources Branch
Department of Northern Affairs
and National Resources
Ottawa 4, Canada.

Photographs were provided through the courtesy of the following organizations:

Atomic Energy of Canada Limited
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Government of Manitoba
Hydro-Electric Power Commission of Ontario
MacMillan Bloedel and Powell River Limited
Manitoba Hydro
National Film Board
New Brunswick Electric Power Commission
Québec Hydro-Electric Commission
Saskatchewan Power Corporation

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DEVELOPMENT OF ELECTRIC POWER IN CANADA

Headgate structure at the Bearspaw hydro plant on the Bow River, Alberta.

History of Power Development

Electric power development in Canada has undergone remarkable and sustained growth since the beginning of the century. The figures in Table 1 indicate the present status of installed generating capacity in hydro and thermal stations and the combined total for all stations in Canada, at December 31, 1964. The graph on page 11 illustrates the expansion in installed generating capacity in hydro and thermal stations that has taken place in the last fifty years.

The graph shows that, although thermal power has made a significant contribution towards satisfying the nation's power needs, hydro power has carried by far the larger part of the burden. This is to be expected when one considers that Canada, in terms of water power resources, is one of the most richly endowed nations in the world.

From a modest total of 133,000 kw. of generating capacity installed at the end of 1900, Canada's total installed hydro capacity rose to the substantial total of over 20.3 million kilowatts by the end of 1964. In the same period, thermal capacity grew to almost 7 million kilowatts.

TABLE I

Installed Electric Generating Capacity in Canada

at 31 December 1964

Province or Territory	Installed Generating Capacity - kw		
	Hydro	Thermal	Total
British Columbia	2,613,000	845,000	3,458,000
Alberta	291,000	936,000	1,227,000
Saskatchewan	320,000	610,000	930,000
Manitoba	747,000	346,000	1,093,000
Ontario	5,937,000	2,865,000	8,802,000
Québec	9,553,000	317,000	9,870,000
New Brunswick	229,000	300,000	529,000
Nova Scotia	143,000	389,000	532,000
Prince Edward Island	-	58,000	58,000
Newfoundland	453,000	73,000	526,000
Yukon Territory	28,000	4,000	32,000
Northwest Territories	17,000	25,000	42,000
CANADA	20,331,000	6,768,000	27,099,000

Although thermal-electric power development in Canada was not well documented early in the century, it is apparent that thermal growth was very slow and of relatively minor importance until the late 1940's. On the other hand, the rate of development of hydro facilities has tended to accelerate since the turn of the century when improvements in electric power transmission techniques were introduced, and increasing emphasis began to be placed on large hydro-electric stations. As a result of the heavier demand for electricity during the prosperous 1920's, the rate of installation increased appreciably.

The drop in power demand in the depression years of the early 1930's did not show up as a drop in the installation rate until about 1935, due to the time lag which is inherent in hydro-electric power development. Hydro projects initiated prior to the depression years were completed, accounting for the continuation of a high rate of capacity installation up until 1935. Thereafter, poor economic conditions reduced the installation rate in the period 1935-1939.

The tremendous demand for power to drive Canada's war industries accounts for the sharp rise in installation of new generating facilities between 1940 and 1943. Construction of new facilities dropped off in the later war years, however, so that from 1944 to 1947, a second flattening in the growth curve is evident.

Post-war industrial expansion and rapidly-growing residential and agricultural developments imposed extremely heavy demands on power generating facilities. To stay abreast of these demands required the

Growth in electric power development in Canada.

Since 1911, Pointe du Bois generating station on the Winnipeg River has supplied power to the city of Winnipeg, Manitoba.

addition of new generating capacity at a rate higher than at any time in Canada's history. The sharp increase in installed generating capacity that followed could not be satisfied from hydro sources alone, giving rise to the first stages of an extensive program of thermal plant construction.

In the period 1950-1964, the average annual rate of installation of both hydro and thermal facilities has been some 1.2 million kilowatts, with hydro contributing two kilowatts of new capacity for each kilowatt contributed by thermal. It is of interest to note, however, that the average increase in thermal generating capacity over the five years from 1959-1964 has equalled the increase in hydro capacity and promises to surpass it in the not too distant future.

Current Trends in Power Development

As has been pointed out earlier, water power traditionally has been the main source of electric energy in Canada. This is still true today. Thermal sources, however, are playing an increasingly important role in power supply and undoubtedly will someday supersede water power as the main supplier of electric energy. The choice between development of a hydro-electric power site and construction of a thermal generating station must take into account a number of complex considerations, the most important of which are economic in nature.

In the case of a hydro-electric project, the heavy capital costs

involved in construction are offset by maintenance and operating costs considerably lower than those for a thermal plant. The long life of a hydro plant and the dependability and flexibility of operation in meeting varying loads are added advantages. Also important is the fact that water is a renewable resource.

The thermal station, on the other hand, can be located close to the demand area, with a consequent saving in transmission costs. With the current trend to large steam stations, however, a certain amount of the flexibility of location of thermal stations is being lost since large steam units require considerable quantities of water for cooling purposes, making it essential that such stations be sited close to an adequate water supply.

The marked trend to thermal development which became apparent in the 1950's can be explained in part by the fact that in many parts of Canada, most of the hydro-electric sites within economic transmission distance of load centres had been developed and planners had to turn to other sources of electric energy. More recently, however, advances in extra-high-voltage transmission techniques are providing a renewed

Sir Adam Beck-Niagara generating stations Nos. 1 and 2, with the associated pumping generating station in the background..

impetus to the development of hydro power sites previously considered too remote.

Because of the relatively long starting-up time required by large thermal units, thermal stations tend to lack flexibility of operation and are most efficient in meeting continuous load conditions. Hydro stations, on the other hand, can put generating units on the line with minimum delay and hence are admirably suited to supply power to meet the peak loads which may occur several times each day. By combining the advantages of both hydro and thermal stations in integrated supply systems, power producers are now achieving much greater flexibility of operation.

Another trend in development designed to meet the problem of varying daily loads is the use of pumped storage. An example is the Sir Adam Beck hydro development at Niagara Falls. At this development, water taken from the Niagara River above the Falls is carried by means of a tunnel and a power canal to the penstocks which supply the main generating station on the bank of the Niagara River some distance below the Falls. In off-peak hours, power from the main station is used to pump water from the power canal into a reservoir maintained at a higher level. During peak-load hours, the pumps, which are dual-purpose units, operate as generators and are driven by water released from the reservoir. The pumping-generating units at the Sir Adam Beck development make available an extra 176,700 kw. of generating capacity. A pumping-generating station using the same general principle is under construction on the Brazeau River in Alberta as part of the 338,440-kw. Big Bend hydro development.

Perhaps the most promising application of the pumping-generating principle is its use in conjunction with nuclear power stations. Nuclear units, in common with the larger conventional thermal units, can be used most efficiently under conditions of continuous operation. Off-peak nuclear power can be used to operate pump-turbine units as previously described and the hydro-electric power derived from operating the units as generators is available for use during periods of peak demand.

Utilization of Installed Generating Capacity

Table 2 lists electric power generating capacity in the provinces and territories under the categories "Utilities" and "Industries".

Utilities

The classification "Utilities" refers to power-producing

TABLE 2

Installed Electric Generating Capacity in Canada

at 31 December 1964

Province or Territory	Installed Generating Capacity - kw		
	Utilities	Industries	Total
British Columbia	2,009,000	1,449,000	3,458,000
Alberta	1,155,000	72,000	1,227,000
Saskatchewan	792,000	138,000	930,000
Manitoba	1,072,000	21,000	1,093,000
Ontario	8,275,000	527,000	8,802,000
Québec	7,589,000	2,281,000	9,870,000
New Brunswick	423,000	106,000	529,000
Nova Scotia	473,000	59,000	532,000
Prince Edward Island	58,000	-	58,000
Newfoundland	492,000	34,000	526,000
Yukon Territory	21,000	11,000	32,000
Northwest Territories	33,000	9,000	42,000
CANADA	22,392,000	4,707,000	27,099,000

organizations who sell most of the power they develop. In some instances, it includes also certain subsidiary companies whose main purpose is to develop and sell power to a parent company for industrial purposes. The total of 22,392,000 kw. of capacity installed in plants operated by utilities represents 83 per cent of Canada's total installed capacity at December 31, 1964.

Industries

The classification "Industries" refers to power-producing organizations who develop power mainly for their own use. While the figures indicate that industries have developed only 17 per cent of

Canada's total installed electric power capacity, it should be emphasized that, in addition to the power generated in their own plants, industries purchase large amounts of power from utilities.

The pulp and paper industry in Canada, one of the world's great industrial enterprises, is one of the foremost users of electric energy. The industry consumes nearly one-fifth of the total electric energy generated in Canada. By far the larger portion of the energy used by the industry is derived from water power.

Pulp and paper development with associated power plant at Ocean Falls, British Columbia.

Total mill capacity for the production of newsprint paper is considerably greater than that of any other country in the world, and in total production of wood pulp, Canada is second only to the United States. The fact that over 90 per cent of the manufactured newsprint is exported gives some indication of the importance of the industry to Canada's export trade program.

The mineral industry in Canada consumes over one-fifth of the country's total energy production. Approximately seventy-five per cent of the energy consumed by the mineral industry is used in the smelting and refining of metals.

Although Canada has no known deposits of bauxite, the availability of low-cost hydro-electric power has fostered the establishment of an aluminum industry which produces one-quarter of the world's supply of this metal. Further evidence of the value of water power to mining operations is provided by the fact that Canada's asbestos industry, which produces approximately half of the total world supply of asbestos, obtains the major part of its power supply from hydro-electric sources.

The incidence of large water power resources in those regions in which the more important mineral deposits have been found has greatly facilitated mining development. Recent examples are the nickel mining and refining complex at Thompson, Manitoba, which uses hydro power generated in the Kelsey plant on the Nelson River, and iron ore mining operations in Labrador supplied by the Twin Falls plant on the Unknown River.

Metal mining, a very important division of the Canada mining industry, is carried on mainly in two physiographic regions, the Western Cordillera and the Canadian Shield. In the Western Cordillera, the mountainous topography and the relatively high amounts of precipitation favour the development of water power. In the Canadian Shield, which is a Precambrian formation stretching in a wide sweep around Hudson Bay from the Mackenzie River basin to the eastern tip of Labrador, heavy glaciation in recent geological times has formed river systems which are comparatively young and are characterized by large numbers of lakes connected by short river sections with numerous rapids and falls suitable for development as hydro-electric power sites.

Twin Falls generating station on the Unknown River in Labrador. With a capacity of 187,200 kw., this is the largest hydro station in the Atlantic Provinces.

Power and Population

The figures in Table 3 illustrate for each Province and Territory, and for Canada as a whole, the estimated population, the installed capacity per thousand of population and the per capita electric energy output.

TABLE 3

Electric Power Statistics - 1964

Province or Territory	Estimated Population	Installed Generating Capacity Per Thousand of Population kw	Per Capita Electric Energy Generated kwh
British Columbia	1,758,000	1,967	9,630
Alberta	1,439,000	853	3,450
Saskatchewan	946,000	983	3,470
Manitoba	960,000	1,139	5,210
Ontario	6,637,000	1,326	5,980
Québec	5,599,000	1,763	10,140
New Brunswick	619,000	855	4,110
Nova Scotia	761,000	699	3,110
Prince Edward Island	108,000	537	1,150
Newfoundland	493,000	1,067	4,800
Yukon and N.W.T.	41,000	1,805	5,980
CANADA	19,361,000	1,400	6,936

For Canada as a whole, there is an average of 1,400 kw. of hydro or thermal generating capacity installed per thousand of population. The average energy generated per thousand of population is 6,936,000 kwh, approximately half the amount which in theory could be generated by 1,400 kw. operating continuously.

Water Power Resources of Canada

Table 4 presents a summary of developed water power in Canada and an estimate of undeveloped water power potential, based on records maintained by the Water Resources Branch.

TABLE 4

WATER POWER RESOURCES OF CANADA

at 31 December 1964

Province or Territory	Undeveloped Water Power			Developed Water Power
	Available Continuous Power at 88% Efficiency			Installed Generating Capacity kw
	at Q95(a) kw	at Q50(b) kw	at Qm(c) kw	
(1)	(2)	(3)	(4)	(5)
British Columbia	6,039,000	17,436,000	32,442,000	2,613,000
Alberta	806,000	2,289,000	3,604,000	291,000
Saskatchewan	387,000	812,000	1,089,000	320,000
Manitoba	2,990,000	5,583,000	5,997,000	747,000
Ontario	493,000	1,148,000	1,747,000	5,937,000
Québec	9,000,000	27,200,000	34,200,000	9,553,000
New Brunswick	62,000	222,000	499,000	229,000
Nova Scotia	21,000	112,000	165,000	143,000
Prince Edward Island	-	1,000	2,000	-
Newfoundland	1,240,000	3,635,000	4,871,000	453,000
Yukon Territory	841,000	3,932,000	6,625,000	28,000
Northwest Territories	525,000	1,153,000	1,826,000	17,000
CANADA	22,404,000	63,523,000	93,067,000	20,331,000

(a) - Power equivalent of flow available 95 per cent of the time.

(b) - Power equivalent of flow available 50 per cent of the time.

(c) - Power equivalent of arithmetical mean flow.

Previous issues of the Branch annual bulletin "Water Power Resources of Canada" have followed the practice of presenting combined estimates of developed and undeveloped power at Canada's known water power sites under the general heading "Available Continuous Power". The method of presenting these statistics adopted in Table 4 of the current publication is considered to be of more practical value. Estimates of available power are shown for undeveloped sites only; for developed sites the total generating capacity actually installed is indicated. It should be emphasized that the capacity installed at an existing hydro-electric development frequently is in excess of the continuous power available at the site. The relationship between installation and available power is explained more fully later in this section.

The method used to compute the power potential of undeveloped water power resources has been revised to conform with the method adopted by the World Power Conference and used by most of the power-producing nations of the world.

To conform further with common international practice, the kilowatt, essentially an electric unit, supersedes the horsepower, which is more closely associated with mechanical power.

Undeveloped Water Power

Column 2 of Table 4 lists the estimated continuous power ordinarily available during periods of low discharge under existing conditions of river flow. These estimates are based upon Q95, which is the natural or modified flow available 95 per cent of the time.

Column 3 lists the estimated dependable maximum power based upon Q50, the natural or modified flow available for at least 50 per cent of the time.

Column 4 lists the estimated dependable maximum power based on Qm, the arithmetical mean flow.

On rivers for which flow records are sparse or non-existent, estimates of flow are made from available information relating to runoff in the same general area.

The hydraulic head used in calculating undeveloped water power is based upon the actual drop or the feasible concentration of head which has been measured or carefully estimated.

It should be emphasized that the figures of undeveloped water power in Columns 2 and 3 represent only the minimum water power possibilities in Canada. The reason for this is that the estimates are

Eaton Canyon Falls on the Kaniapiskau River, Québec.

based upon existing river flows, which for the most part do not reflect the benefits of streamflow regulation that would result from the development of storage potential. The figures in Column 4, on the other hand, are determined from the arithmetical mean flow and represent the power which would be obtainable if the entire flow in the river could be regulated to provide a continuous flow of constant magnitude. It can readily be seen that, because the latter condition assumes complete regulation, estimates of potential based upon arithmetical mean flow will, if other pertinent factors are neglected, exceed the amount of installed capacity that might be expected to be installed at the site, particularly where little or no storage is available. Recent experience in the development of water power sites, however, has indicated that in fact, the generating capacities installed at many sites are very considerably in excess of what might be dictated by even the arithmetical mean flow.

Estimates of the magnitude of undeveloped water power resources have been revised substantially upwards as a result of a recent major review of the water power inventory of Canada. The estimates will continue to be revised from time to time as more complete information becomes available, particularly on rivers in the more remote northerly areas.

Several major river diversion possibilities exist, particularly in British Columbia, where topographical conditions make possible such rearrangements of flow. The estimates of potential of British Columbia's undeveloped hydro resources have been boosted substantially, largely because of the inclusion of figures based upon the diversion of rivers

Whitemud Falls on the Nelson River, Manitoba.

which, if they are developed at all, will almost certainly be developed on a combined-river basis.

Developed Water Power

The figures of installed generating capacity shown in Column 5 of Table 4 are based upon the manufacturer's rating in kilowatts as shown on the generator name-plate, or derived from the rating where it is indicated in kilovolt-amperes.

The maximum economic installation at a power site can be determined only by careful consideration of all the conditions and circumstances pertinent to its individual development. It is the usual practice, however, to install units which have a combined capacity in excess of the available continuous power at Q50, and frequently in excess of the power available at Qm. There are a number of reasons for this. The excess capacity may be installed for use at peak-load periods, to take advantage of periods of high flow, or to facilitate plant or system maintenance. In some instances, storage dams have been built subsequent to initial development to smooth out fluctuations in river flows. In other cases, deficiencies in power output during periods of low flow have been offset by auxiliary power supplied from thermal plants, or by interconnection with other plants which operate under different load conditions or are located on rivers with different flow characteristics.

The extent to which the installed capacity exceeds the available continuous power at the various rates of flow thus is dependent upon the factors which govern the system of plant operation, and varies widely in different areas of the country. In some developments, the difference may amount to several hundred per cent. For this reason, discretion should be used in comparing the figures in Column 5 with those in Columns 2, 3 or 4, as available continuous power and installed capacity are not directly comparable. As a rough guide, however, it may be assumed that the power equivalent of the flow at Q50 represents an approximate, if conservative, estimate of hydro generating capacity remaining to be installed in Canada.

Water Power Distribution in Canada

Table 4 indicates the manner in which undeveloped water power resources and installed generating capacity in Canada are distributed throughout the provinces and territories. A review of the table shows that substantial amounts of water power have been developed in all provinces except Prince Edward Island, where water power resources are meagre. As the development of Canada's natural resources proceeds, the fortunate incidence of water power in proximity to mineral deposits, pulpwood and other natural resources becomes increasingly apparent. There is little doubt that the existence of large amounts of potential hydro power on northern rivers will prove to be a factor of prime importance in the eventual realization of the natural wealth of Canada's North.

BRITISH COLUMBIA, traversed by three distinct mountain ranges and with, generally speaking, a high rate of precipitation, has many mountain streams which offer abundant opportunity for the development of hydro-electric power. In terms of recorded available water power resources, developed and undeveloped, the province ranks second in Canada, and is exceeded only by Québec and Ontario in the amount of generating capacity installed.

Notable for the magnitude of their power potential are such rivers as the Columbia, Fraser, Peace and Stikine. Up to the present time, however, hydro-electric developments on smaller rivers in the southern part of the province have been called upon to satisfy the major load requirements of British Columbia. The immense power resources of the Peace River are now in process of being harnessed and by 1968 will supply energy to the southern part of the province. Development of the Columbia River, now getting under way, is designed to provide initially three huge storage reservoirs and eventually to make available a significant amount of "at site" power in the Canadian portion of the basin.

The foremost producer and distributor of electric power in

Built inside a mountain, the 707,200-kw. Kemano generating station serves the aluminum industry in British Columbia.

British Columbia is the provincially-owned British Columbia Hydro and Power Authority.

In ALBERTA, the principal hydro-electric developments are located on the Bow River and its tributaries, and from these developments, Calgary Power Ltd. serves most of the southern part of the province. Substantial water power resources are located in northern regions of the province, and although these are somewhat remote from present centres of population, the advent of extra-high-voltage transmission has enhanced the prospect of their development.

In SASKATCHEWAN, large water power resources exist in the central and northern parts of the province, principally on the Churchill, Fond du Lac, and Saskatchewan Rivers. In 1963, power from the first development on the Saskatchewan River was fed into the transmission network of the provincially-owned Saskatchewan Power Corporation, which serves the more settled areas of the province. These areas previously had been served by electric power from thermal-electric plants fuelled by coal, oil or natural gas, while hydro-electric power generated in the province had been used almost exclusively for mining purposes in northern areas.

Of the three Prairie Provinces, MANITOBA, with immense hydro-electric capabilities on the Winnipeg, Churchill, Nelson and Saskatchewan Rivers, is the most generously endowed with water power resources. Until recently, hydro-electric generating stations on the Winnipeg River supplied most of the electric power requirements in southern Manitoba. With the advent of high-voltage, long-distance transmission, however, it

may be expected that ever-increasing amounts of power from hydro-electric stations on northern rivers will be carried south to help meet the province's constantly growing power demands.

McArthur generating station on the Winnipeg River, Manitoba.

Almost all of the sizeable water power potential in ONTARIO within easy reach of demand centres has been developed and planners are looking to the more remote sites as new sources of supply. Improvements in long-distance transmission techniques have brought many of these

Pine Portage generating station on the Nipigon River, Ontario.

sites within the economic orbit of demand centres. Several sites are at present being developed and a number of others are under investigation. Most of the hydro-electric power produced in the province comes from the generators of the Hydro-Electric Power Commission of Ontario, Canada's largest power producing and distributing organization. Ontario's largest generating station is located on the Niagara River at Queenston, where the Sir Adam Beck - Niagara Generating Stations Nos. 1 and 2, and the associated pumping - generating station have a combined generating capacity of 1,804,200 kw. In addition to the power generated in its own plants, the Commission purchases large amounts of electric power generated outside the province, chiefly in Québec.

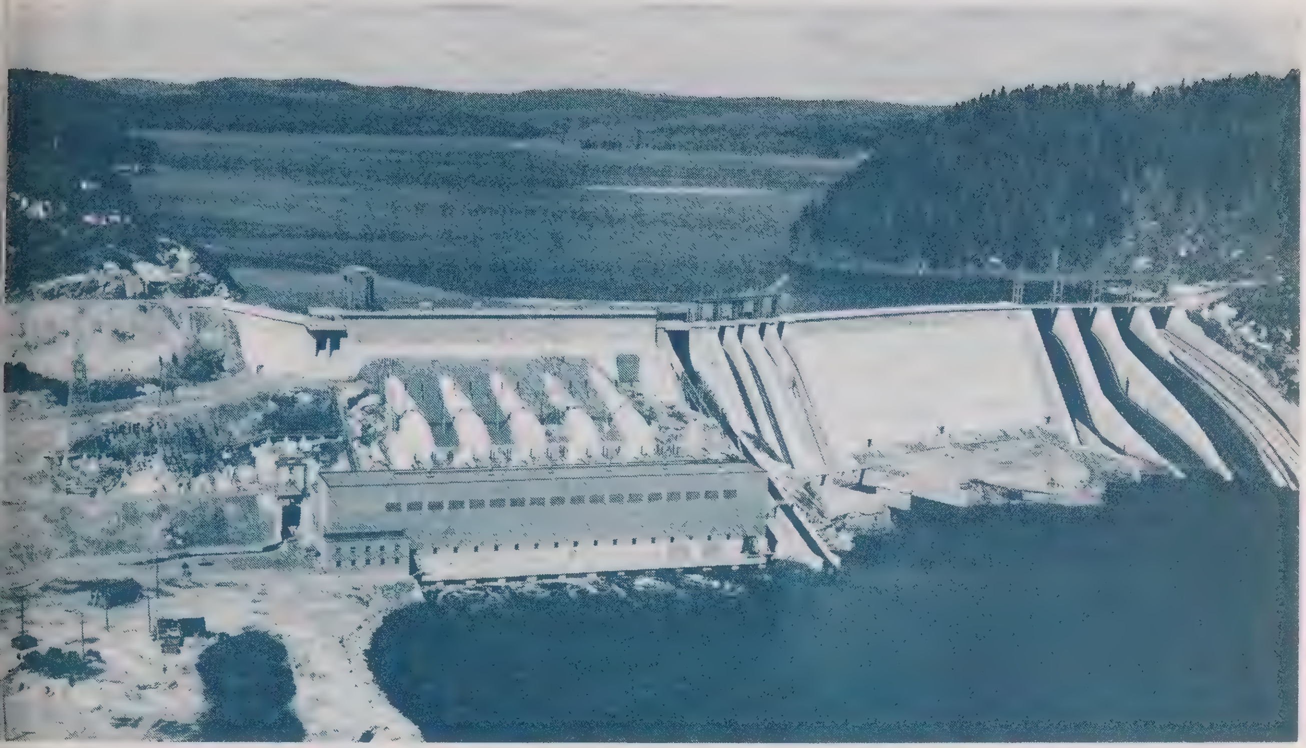
QUÉBEC is richest of all the provinces in water power resources, possessing approximately 45 per cent of the total recorded for Canada. Québec also leads in developed water power - its present installation of 9.6 million kilowatts representing about 47 per cent of the national total. The largest single hydro-electric installation in Canada is the Québec Hydro-Electric Commission's 1,574,260-kw. Beauharnois development on the St. Lawrence River. Also notable are the Commission's Bersimis I development on the Bersimis River with an installed capacity of 912,000 kw. and the Aluminum Company of Canada Limited 717,000-kw. Shipshaw plant on the Saguenay River. A major power scheme which represents a significant advance in the development of Québec hydro-electric resources is now under construction. This scheme, involving the harnessing of the headwaters of the Manicouagan and Outardes Rivers, will permit the eventual installation of some 5.6 million kilowatts of new capacity on the two rivers.

Power production in the province is facilitated by the regulation of streamflow by the Québec Department of Natural Resources through the storage dams which it owns and operates.

In 1963, the Government of Québec, through the Québec Hydro-Electric Commission, purchased the assets of the major private electric utilities in the province.

The water power resources of NEW BRUNSWICK and NOVA SCOTIA, although small in comparison with those of other provinces, are a valuable source of energy and make a substantial contribution to the economies of the two provinces. Numerous rivers in both provinces provide moderate-sized power sites either within economic transmission distance of the principal cities and towns or advantageously situated for use in development of the timber and mineral resources. These provinces also are favoured with abundant indigenous coal supplies. In PRINCE EDWARD ISLAND, there are no large streams and water power plants are limited in size to those used to operate small mills.

The water power resources of NEWFOUNDLAND, determined on the basis of the limited available streamflow data, are estimated to be of very considerable magnitude. On the island, although the length of the rivers is generally not great, topography and runoff are favourable



Exterior and interior views of the 286,200-kw. Trenche hydro-electric station on the St. Maurice River, Québec.

for hydro-electric power development. Of the substantial capacity installed, a very large portion serves the pulp and paper industry. In Labrador, the Hamilton River and its tributaries, for the most part undeveloped, constitute one of the largest sources of water power in Canada.

The YUKON TERRITORY and NORTHWEST TERRITORIES, which together comprise most of Canada's northland, possess extensive water power resources. Power from present developments is used almost exclusively to satisfy the needs of local mines and adjacent settlements. Due to the lack of developed native fuel sources and to transportation difficulties, water power is of special importance in the development of mining areas such as Yellowknife in the Northwest Territories and Mayo in Yukon Territory. In 1948, to encourage the development of the resources of northern Canada, the Federal Government established what is now the Northern Canada Power Commission, to be responsible for the construction and management of public utility plants. The Deputy Minister of Northern Affairs and National Resources is Chairman of the Commission and the Director of the Water Resources Branch is a Member.

In YUKON TERRITORY, most of the resources are located on the Yukon River and its tributaries. The possibility exists of diverting the headwaters of the Yukon River through the Coast Mountains to utilize a high head near tidewater in northern British Columbia. Such a development, however, would affect adversely the potential of sites on the main river.

Resources in the NORTHWEST TERRITORIES have not been surveyed to the same extent as those in Yukon Territory, but they are nevertheless known to be of considerable magnitude. Extensive water power resources exist on rivers flowing into Great Slave Lake. Of major significance is the hydro-electric potential of the South Nahanni River, which drains to the Mackenzie River via the Liard River. On the basis of preliminary investigations, it is estimated that, with total regulation and complete use of the head susceptible of development, the hydroelectric potential of the South Nahanni River would total close to one million kilowatts. Indications are that the rivers draining the District of Keewatin, north of Manitoba, also will contribute materially to the total power potential of the Northwest Territories.

Thermal Power Development in Canada

The incidence of immense water power resources in Canada and the brisk pace of their development has tended to overshadow the very considerable contribution being made by thermal energy in the nation's power economy. At the end of 1964, the total installed thermal generating capacity in Canada was 6,768,000 kw., about 25 per cent of the total of all

Boundary Dam thermal-electric station (132,000 kw.) at Estevan, Saskatchewan.

electric generating capacity in the country. The fact that energy produced in thermal plants during the year accounted for only 13 per cent of the total may be attributed in part to the fact that a considerable amount of the capacity installed is maintained for stand-by purposes.

As has been stated earlier in this report, however, the current emphasis on thermal plant construction is one which is likely to continue and to become more marked as development of the nation's water power reserves becomes more complete.

A 31,680-kw. steam unit, largest of three units installed in the Harmac thermal station at Nanaimo, British Columbia.

Conventional Thermal Power

THERMAL GENERATING STATIONS

Approximately 85 per cent of all the conventional thermal power generating equipment in Canada is driven by steam turbines. The magnitude of the loads now being carried by steam plants has led to the installation of steam units with capacities as high as 300,000 kw. Even larger units, of 500,000-kw. capacity, will go into service within the next three or four years. The remainder of the load is carried by gas turbine and internal combustion equipment. The flexibility of internal combustion engines make this type of equipment particularly suitable for meeting power loads in smaller centres, especially in the more isolated areas.

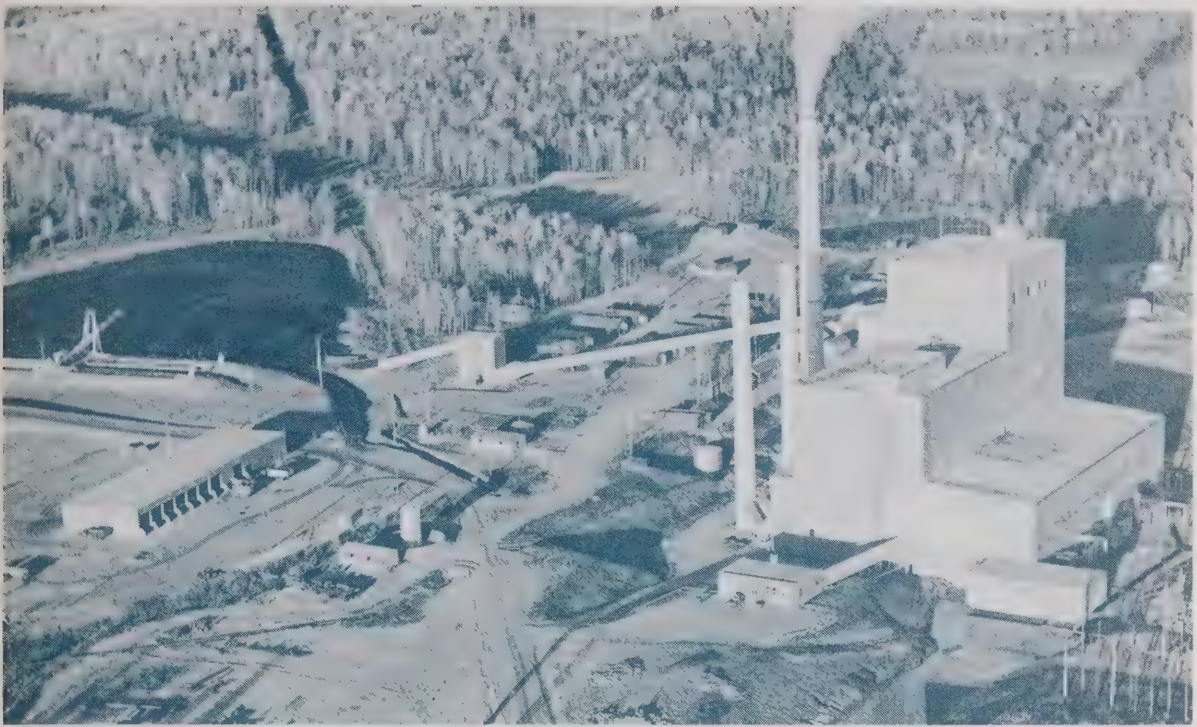
The figures in Table 1 indicate that the provinces of Alberta, Saskatchewan, Nova Scotia and Prince Edward Island depend upon thermal capacity for most of their power requirements. New Brunswick has slightly more thermal than hydro. In Ontario, where the present hydro capacity is about twice the thermal, forecasts based upon present construction schedules indicate that by the early 1970's the province's total installed thermal capacity will have overtaken hydro.

More than half of BRITISH COLUMBIA'S thermal generating capacity is installed in three plants located in the Vancouver area. The capacity of the largest of these plants, the 300,000-kw. Burrard generating station, is expected to be increased to 600,000 kw. by 1967. The addition of a further 300,000 kw. at Burrard may be delayed by the availability of Peace River power in 1968.

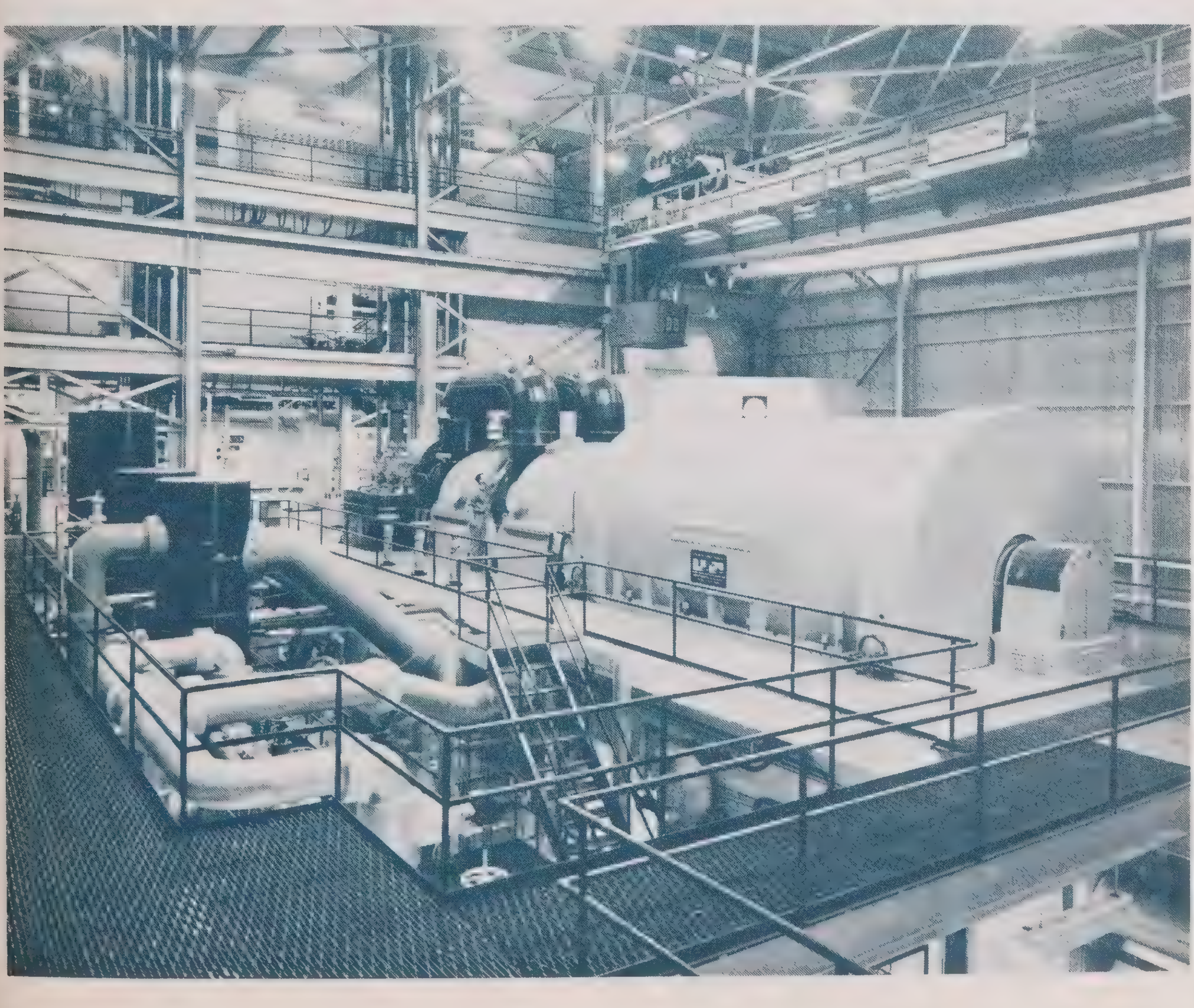
The incidence of vast fuel resources in ALBERTA accounts for the emphasis on thermal power generation in the province. Alberta's largest thermal plants are the 330,000-kw. gas turbine and steam station at Edmonton and the 282,000-kw. Wabamun steam station.

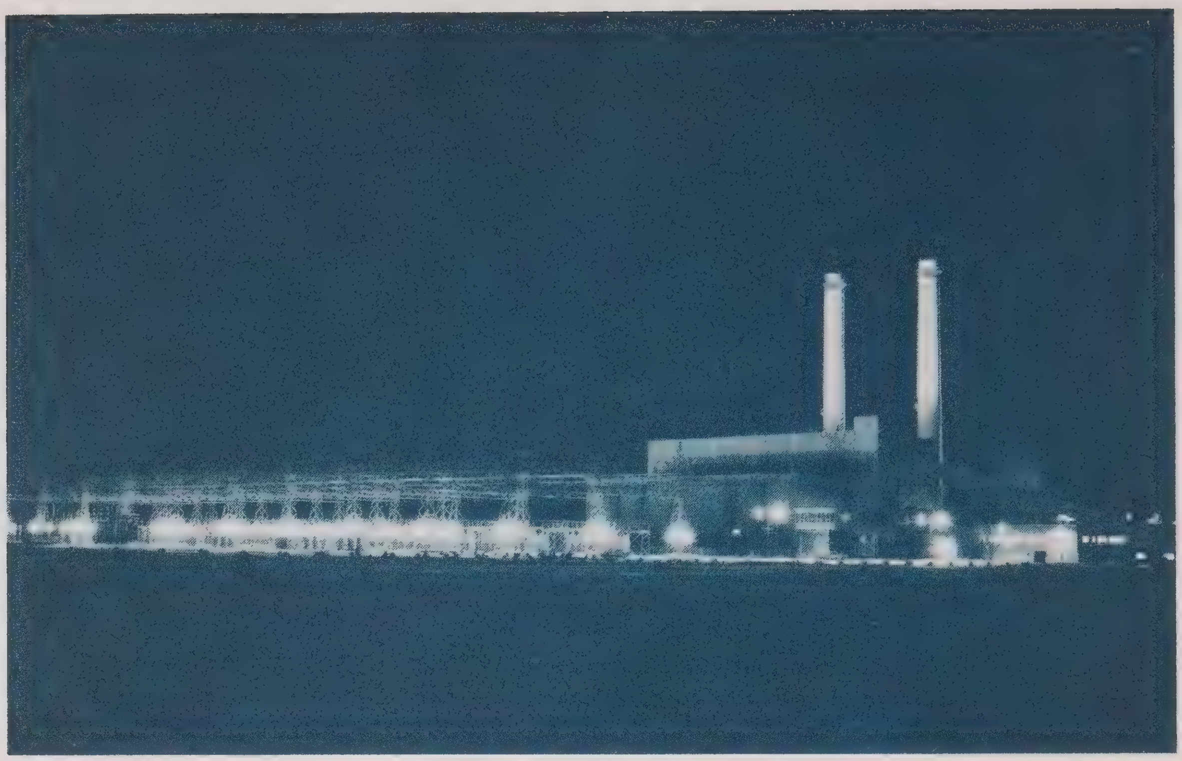
Until recently, SASKATCHEWAN has relied upon thermal capacity to satisfy the needs of the more settled areas, hydro-electric power generated in the province being used almost exclusively for mining purposes in northern areas. Within the last few years, however, development of storage on the South Saskatchewan River has made hydro-electric power available in the southern part of the province. At present the province is concentrating on the installation of additional hydro capacity on the Saskatchewan and South Saskatchewan Rivers and has not scheduled any new thermal capacity.

MANITOBA supplements its predominantly hydro-based power supply with a substantial amount of thermal capacity. As in the case of Saskatchewan, however, the current emphasis is on development of the province's water power resources.



Exterior and interior views of the Wabamun thermal station in Alberta.





A 132,000-kw. thermal-electric station at Brandon, Manitoba.

ONTARIO has more thermal capacity than any other province in Canada. The thermal capacity installed in the province at the end of 1964 totalled 2,865,000 kw., approximately 42 per cent of the national total. With another 4.8 million kilowatts of thermal capacity scheduled for service in Ontario in the period 1965-1971, the province's share of the national total promises to increase considerably. The country's largest thermal station is Ontario Hydro's 1,200,000-kw. Richard L. Hearn generating station. Three 300,000-kw. units, the largest in operation in Canada, make up the generating capacity at the Lakeview station, scheduled for expansion to 2.4 million kilowatts by 1968. Even larger units of 500,000-kw. capacity are planned for the Lambton station, designed for a total capacity of 2 million kilowatts in four units, for installation between 1968 and 1971.

The abundance of QUÉBEC'S water power wealth, much of it within economic transmission distance of existing demand areas, has tended to limit the applications of thermal power to specific local use. However, the growing emphasis on thermal power in other parts of Canada, is also beginning to be apparent in Québec, where thermal capacity will serve not only to help guarantee an adequate power supply in the face of increasingly heavy demands but also to render the almost exclusively hydro-electric base more flexible through integrated operation. The first unit of a large thermal plant went into operation at Tracy near Sorel in 1964 and a second large plant is planned for service in the Gaspé region by 1970.

Most of the energy generated in thermal electric utility plants in NOVA SCOTIA is derived from coal, with a smaller amount from petroleum fuels. In NEW BRUNSWICK, however, petroleum fuels provide slightly more than half of the thermal-electrical energy. PRINCE EDWARD ISLAND depends almost exclusively on thermal sources for its power supply; almost all the province's generating capacity is oil-fuelled. With the exception of several sizeable plants in St. John's and Grand Falls, most of the thermal-electric capacity in NEWFOUNDLAND is made up of relatively small units used to supply power to small, often isolated communities. With the wealth of water power readily available in the province, it is not likely that Newfoundland will experience the need for large thermal stations for some time to come.

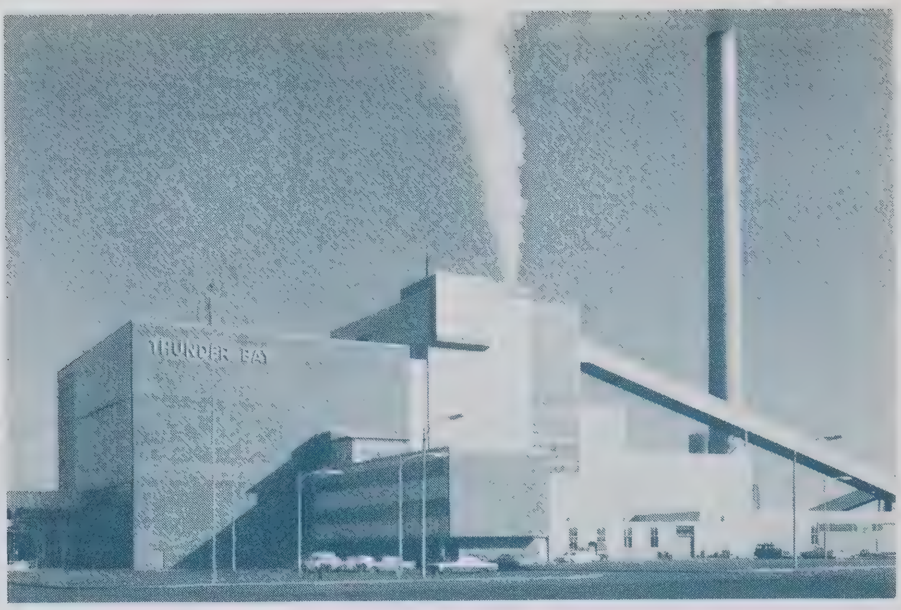
Thermal-electric energy satisfies most of the power requirements in the NORTHWEST TERRITORIES; in YUKON TERRITORY, hydro is the larger contributor. Most of the thermal-electric energy in the Territories is generated by small diesel units.

FUELS

Canada has been favoured by nature not only with abundant water power resources, but with exceedingly generous supplies of the fuels from which energy can be produced. Most important of these are coal, petroleum, natural gas and the radio-active ores used to fuel nuclear reactors.

Most of Canada's coal, which is by far the country's most abundant fuel resource, is found in the western provinces, chiefly Alberta. Smaller

Strip-mining operations to supply coal for Wabamun steam station in Alberta.



Coal is used to fuel the 100,000-kw. Thunder Bay generating station at Fort William, Ontario.

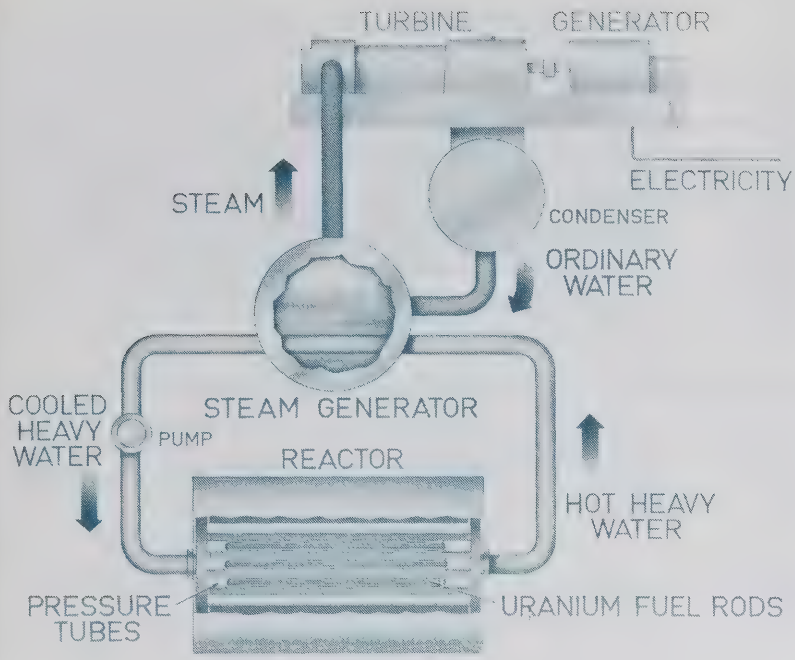
quantities occur in the Maritime provinces of Nova Scotia and New Brunswick. As with coal, practically all of Canada's oil and natural gas reserves are located in the western provinces, with the greatest concentration in Alberta. The highly populated, industrial areas of southern Ontario and Québec are devoid of indigenous fuel supplies and have to rely upon fuels imported from other provinces and from outside Canada. Uranium, the fuel used in Canada's reactors, is available in considerable quantity in both eastern and western Canada.

In 1962, the latest year for which statistics are available, 60 per cent of the total energy produced in thermal-electric utility plants was derived from coal. Gas, most of which is natural gas, accounted for 28 per cent and petroleum fuels, 12 per cent.

Ontario and Saskatchewan burned most of the coal used, with Nova Scotia, Alberta, New Brunswick and Manitoba accounting for smaller amounts. Almost all the gas was used in western Canada, principally in Alberta. Petroleum fuels were used in every province in Canada. Saskatchewan accounted for the largest quantity of petroleum fuels, followed by New Brunswick, Nova Scotia and Prince Edward Island in that order.

Nuclear Thermal Power

Commercial electric power generated from the heat of nuclear reaction became a reality in Canada in 1962 when the 20,000-kw. Nuclear Power Demonstration station at Rolphton, Ontario, fed power for the first time into a distribution system in Ontario. The NPD station is the



Schematic diagram of the Nuclear Power Demonstration station at Chalk River, Ontario.

forerunner in a series of increasingly large nuclear stations that will shoulder more and more of Canada's rapidly growing power loads.

Research into reactor design and the application of nuclear energy in the electric power field are among the more important responsibilities of Atomic Energy of Canada Limited, a Government of Canada Crown Company incorporated in 1952.

CANDU REACTOR [1]

AECL has concentrated its efforts on the development of the CANDU reactor, which uses natural uranium as a fuel and heavy water as the moderator. By using heavy water as the moderator, a high energy yield can be obtained from natural uranium and since natural uranium is a low-cost nuclear fuel, the cost of fuel is a minor component in the cost of producing power. Natural uranium has the added attraction of being available in commercial quantities in Canada.

The Canadian nuclear power reactor also offers the simplest of nuclear fuel cycles. Sufficient energy can be extracted from the fuel so that the economics of the system do not require a value to be placed on the spent fuel. There is, therefore, no need to carry out costly chemical processing of the spent fuel unless the worth of the remaining contained fissile material becomes sufficiently high to make chemical processing an economic proposition. The spent fuel is an ideal package for simple underwater storage and no large volume of highly radio-active liquids from a chemical processing plant has to be handled and contained.

NUCLEAR POWER STATIONS

The Nuclear Power Demonstration station, previously mentioned,

1. Atomic Energy of Canada Limited, Annual Report 1963-64.

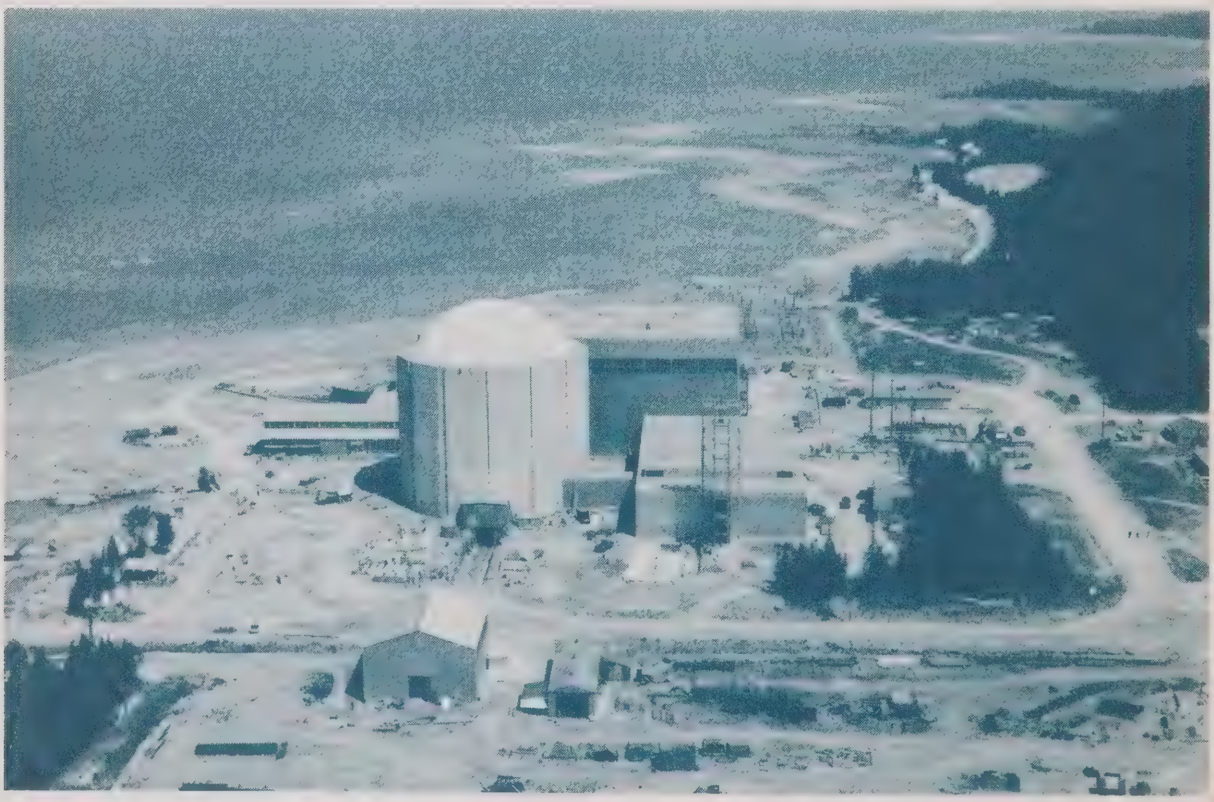
has been used extensively to demonstrate the ability of the system to operate at a high capacity factor and to determine the nature and predictability of outages. Fuel changes while the system is in operation have become routine and a considerable amount of research into the sources of heavy water losses has been carried out. As a result of this research, losses have been cut considerably and the NPD is demonstrating that a very acceptable heavy water loss rate is attainable.

At Douglas Point on the shore of Lake Huron, the country's first full-scale nuclear power station is under construction. The station, being built with the co-operation of Ontario Hydro, will house a 200,000-kw. CANDU reactor and will produce first power in 1965.

Experience gained in the design and operation of the CANDU reactor has encouraged the development of even larger units and plans have been announced for the construction of a two-unit, 1,080,000-kw. nuclear station to be built near Toronto, with in-service dates for the two units scheduled for 1970 and 1971.

To complement the research facilities at Chalk River, Ontario, AECL is building a nuclear research establishment at Whiteshell, about 65 miles northeast of Winnipeg, Manitoba. The first major experimental facility will be an organic cooled, heavy water moderated reactor with an initial design power output of 40,000 kw.

Scheduled for initial operation in 1965, Canada's first nuclear-electric station at Douglas Point on the shore of Lake Huron will make available 200,000 kw. of generating capacity.



Transmission towers on the 230-kv. line in Labrador's Wabush Lake region.

Electric Power Transmission

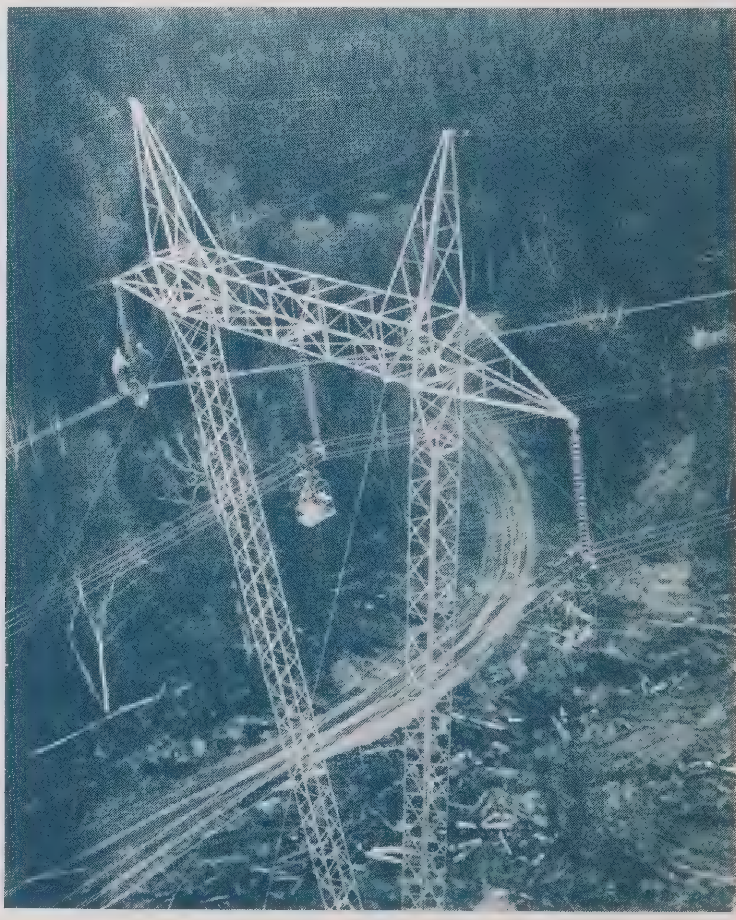
In the early days of the power industry in Canada, power systems were small and far apart and were designed to supply specific local needs. The nature of the loads handled by these systems was not such as to warrant the expense of interconnection between systems. As time went on, however, the loads increased and changed in nature, the systems grew in size and improved techniques reduced transmission costs. The benefits of interconnection to integrate smaller power systems were re-appraised in the light of changing conditions and were found to offer advantages which far outweighed the costs.

The resulting amalgamation of the small systems into larger operating groups has gone on steadily and today most of the power produced in Canada comes from generating stations which are components in the large integrated and often interconnected power systems operated by power utilities and companies in the various provinces.

The integral role of power transmission in this process is obvious. In the days of small, self-contained power systems, it was not necessary to carry power over great distances and low operating voltages were adequate. With the increase in transmission distances from the point of generation to the point of distribution and thence to

the user, transmission methods had to be improved and operating voltages increased. Moreover, the growth in power demand was forcing power producers to consider the development of hydro-electric sites previously considered to be outside the economic transmission radius, adding impetus to research in the field of extra-high-voltage (EHV) transmission.

This research has resulted in a successive stepping-up of transmission voltages. At the present time, there are in operation or under construction in Canada, a number of transmission lines designed for operation at voltages of 500 kilovolts (kv.) or more. In British Columbia, a 500-kv. line connects the British Columbia Hydro and Power Authority system with the Bonneville Power Administration system in the State of Washington. The line is being operated for the present at 230 kv. A second interconnection between the two systems, designed for eventual operation at 500 kv., is under construction. Power from the Peace River will be carried to the Lower Mainland of British Columbia via a 574-mile, 500-kv. line, at present under construction. The southern limit of construction of the EHV line from the hydro plants in the James Bay watershed is moving steadily closer to Toronto. When the entire 440-mile line is complete in August 1966, energy will be fed from the Pinard collector station to the Toronto area at 500 kv. Power from the Manicouagan-Outardes hydro complex in Québec will be carried to load



When completed in 1966, this 500-kv. EHV transmission line will extend from the James Bay watershed to Toronto, a distance of 440 miles.

Anchor towers each supporting 11,220 feet of cable on the Kootenay Lake crossing in British Columbia.

centres in the Québec City and Montreal areas over three 735-kv. lines. The operating voltage of 735 kv. will be among the highest in use anywhere in the world. The first of the three 735-kv. lines is under construction and will go into operation in 1965 when first power from the Manic 2 development becomes available.

It is obvious that, with the tremendous increase in transmission distances, transmission costs will represent a much higher factor in the total cost of supplying power. The search for economies has led to many improvements not only in the materials used but also in tower erection and cable stringing methods. Guyed aluminum V-shaped or Y-shaped transmission towers are being used increasingly where the terrain is suitable in place of self-supporting towers and erection costs are being lowered by using helicopters to transport tower sections to the site and for tower assembly. The use of helicopters for spraying for bush control on line right-of-way and for line inspection is becoming more widespread.

National Power Grid

The steady increase in effective transmission distances made possible through development of EHV transmission techniques has engendered a great deal of interest in the establishment of a national grid which would tie together the power producing and distributing systems of the provinces. The Government of Canada is co-operating with provincial authorities in carrying out studies to determine the physical and economic possibilities of establishing a national power grid.

At present, interconnections of from 66 kv. to 230 kv. exist between systems in Alberta and British Columbia; between Saskatchewan, Manitoba and the northwestern Ontario system; the interconnected north-eastern and southern Ontario systems and Québec, and between New Brunswick and Nova Scotia.

There are important international interconnections between British Columbia and the State of Washington; Ontario and the State of Michigan; Ontario and the State of New York; Québec and the State of New York, and between New Brunswick and the State of Maine.

PROGRESS IN DEVELOPMENT - 1964

Carillon generating station (654,500 kw.) on the Ottawa River.

General Review

In 1964, a net total of 754,000 kw. of electric generating capacity was installed in Canada to help meet the nation's constantly growing requirements for electric power. The net total of 754,000 kw. included 481,000 kw. of thermal capacity and 273,000 kw. hydro. Re-scheduling of several large units accounts for most of the difference between the total of 1,349,000 kw. forecast for 1964 and the amount actually installed.

The new capacity put into service in 1964 boosted the nation's total installed hydro generating capacity to 20.3 million kilowatts and total installed thermal capacity to 6.8 million kilowatts.

An impressive year in the electric power construction field in Canada is forecast for 1965 when 2.3 million kilowatts of new generating capacity are to go into operation. This total is made up of 1.4 million kilowatts of hydro capacity and 0.9 million kilowatts of thermal.

The rate at which electric power demands are growing allows for no slackening in the current pace of development of new generating

facilities. To meet anticipated demands, Canada's power producers have 17.3 million kilowatts of new capacity either under construction or scheduled for service within the next few years. This does not include any of the vast potential that will eventually be developed on the Hamilton, Columbia and Nelson Rivers and on other major river systems in Canada. The scheduled figure of 17.3 million kilowatts which includes the 2.3 million kilowatts forecast for 1965, consists of 10.5 million kilowatts hydro and 6.8 million kilowatts thermal.

HYDRO POWER

Two of the larger hydro projects under construction in 1964 were the Portage Mountain development on the Peace River in British Columbia and the giant Manicouagan - Outardes hydro complex in Quebec. The dam at Portage Mountain, scheduled to reach full height of 600 feet by 1968, will create a reservoir 680 square miles in area. The generating station, designed for a capacity of 2,270,000 kw., will house the greatest concentration of power generating facilities in British Columbia. First power from Portage Mountain is scheduled for 1968. In the Province of Québec the construction program on the Manicouagan and Outardes Rivers will add 747,500 kilowatts of new capacity in 1965 and will eventually boost the present modest installation of 241,250 kw. on these two rivers to a total of almost six million kilowatts.

One of the largest hydro-electric units installed in Canada will go into service in 1965 at Big Bend on the Brazeau River in Alberta. The turbine is rated at 210,000 hp. and the generator at 144,000 kw. A second, larger unit with a 250,000-hp. turbine and 175,000-kw. generator is scheduled for initial operation at Big Bend late in 1966.

In Labrador, plans for the development of about 5 million kilowatts at Grand Falls on the Hamilton River have been delayed pending the outcome of discussions aimed at reaching agreement on possible transmission routes to potential markets. On the island of Newfoundland, construction of a 450,000-kw. development has been scheduled for 1965 for the Bay d'Espoir site on the Salmon River. In neighbouring New Brunswick, a start was made on construction of the 600,000-kilowatt Mactaquac development on the Saint John River.

COLUMBIA RIVER

In September 1964, the Governments of Canada and the United States exchanged instruments of ratification for the Columbia River Treaty and Protocol, clearing the way for a start on construction of this ambitious international power project. Under the Treaty, Canada is entitled to one-half the power benefits accruing in the United States from the regulation of 15.5 million acre-feet of water stored in Canada behind the proposed Duncan Lake, Arrow and Mica Dams. In addition, Canada

will receive one-half the value of the estimated flood damage prevented in the United States through operation of the proposed dams for flood control. Completion of the storage reservoirs in Canada will afford "at site" development of several million kilowatts of hydro-electric capacity in the Canadian portion of the basin.

THERMAL POWER

Canada's growing dependence upon thermal power is evident from the fact that 56 per cent of the total generating capacity put into service in 1964 was thermal. Moreover, the total of 920,000 kw. of thermal capacity scheduled for 1965 will be almost twice the thermal capacity installed in 1964. The substantial total of 5,916,000 kw. of thermal capacity scheduled for installation subsequent to 1965 is a clear indication that thermally-generated power will play an increasingly important role. The growing emphasis on thermal power is due in part to recognition of the flexibility of operation offered by integrated power systems using both hydro and thermal equipment, and in part to the fact that most of Canada's major hydro sites which are at present within economic transmission distance of power markets have been developed.

Significant thermal additions in 1964 were the 300,000-kw. unit installed in the Lakeview generating station near Toronto and the 150,000-kw. unit put into service at the Tracy plant near Sorel in Québec. The present capacity of 900,000 kw. at Lakeview will be increased by 300,000 kw. in 1965, and in 1968 development of the station will be complete with a total installed capacity of 2,400,000 kw. A second 150,000-kw. unit is scheduled for the Tracy plant in 1965 and two more in 1967 to bring the station's total capacity to 600,000 kw. At the Burrard thermal station near Vancouver, British Columbia, a 150,000-kw. unit to be installed in 1965 will give the station a generating capacity of 450,000 kw. The ultimate capacity at Burrard will be 900,000 kw. in six units.

Canada has acquired a considerable reputation for research in nuclear reactor design and the application of nuclear energy in the production of electric power. From a modest beginning in 1962 when 20,000 kw. of nuclear thermal-electric capacity became available for commercial purposes, the nation's installed nuclear capacity will be boosted in 1965 by another 200,000 kw. with commencement of operation of the Douglas Point nuclear station in Ontario. The year 1971 should see completion of a two-unit, 1,080,000-kw. nuclear station east of Toronto, on the shore of Lake Ontario. These are the first of many nuclear-electric plants which will share to an increasing extent the burden of supplying power to expanding markets.

POWER TRANSMISSION

Continuing research into electric power transmission techniques

has led to the use in Canada of line voltages as high as 500 kilovolts (kv.). Even higher line voltages will come into use in 1965 when the first of three 735-kv. lines from the Manicouagan-Outardes complex carries energy to load centres in Québec Province. The consequent extension of economic transmission distances has led power engineers to re-examine the status of many hydro sites, previously considered remote.

Another outcome of the increase in effective transmission distances is the interest engendered in a national power grid which would interconnect the power distribution systems of the provinces. The Government of Canada is co-operating with provincial authorities in carrying out studies to determine the physical and economic possibilities of establishing a trans-Canada grid.

Progress in the Provinces

British Columbia

Although the total electric power generating capacity in British Columbia remained unchanged in 1964, the year saw continuation of a far-reaching program of planning and development which will boost the province's total by more than three million kilowatts in the years ahead.

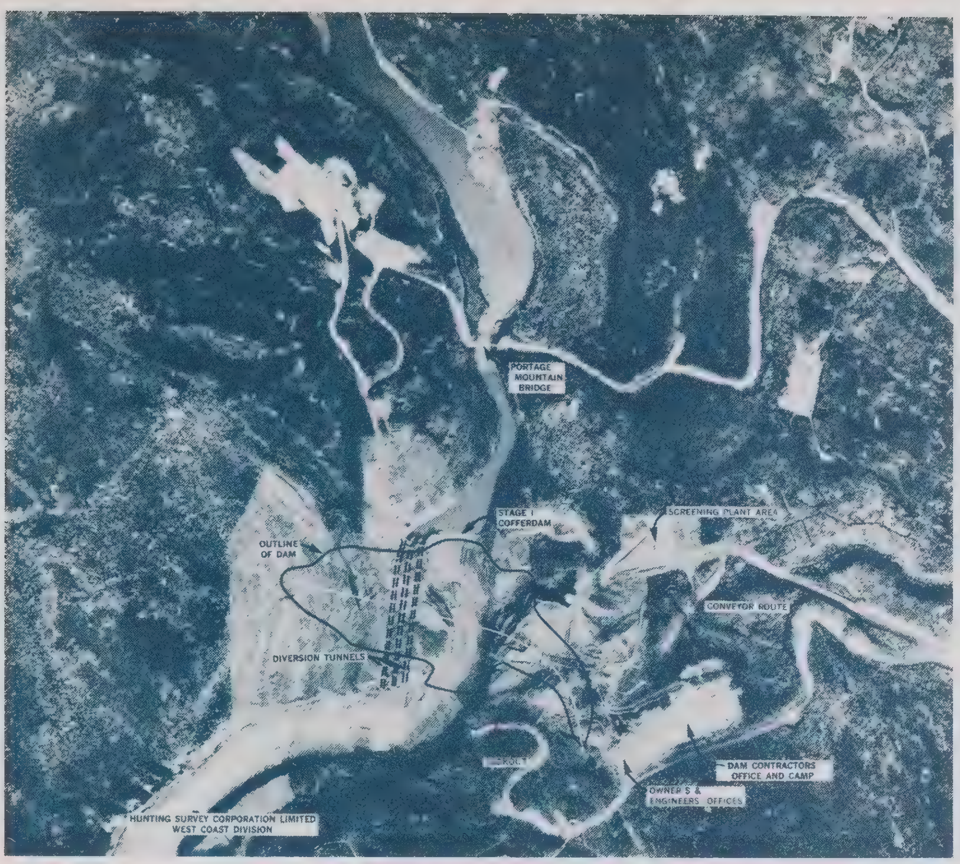
In 1965, additions to existing plants will increase power capacity in the province by 150,000 kw. thermal and 4,000 kw. hydro. At present, however, a total of 2,902,100 kw. is scheduled for installation after 1965. Hydro accounts for 2,452,100 kw. of the total amount scheduled.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

PEACE RIVER

The Authority reports substantial construction progress at the Portage Mountain site on the Peace River. A major part of the project will be a 600-foot-high dam containing 60 million cubic yards of material and creating a 680-square-mile reservoir impounding a total of 62 million acre-feet of water. The powerhouse will be underground and will house ten units with a total capacity of 2,270,000 kw. Three units are scheduled for service by the autumn of 1968.

In 1964, the three 48-foot-diameter, 2,500-foot-long tunnels, built to carry the river past the construction site, successfully handled the largest flow of record on the Peace River.



Aerial photograph shows the main features of the construction area at Portage Mountain site on the Peace River, British Columbia.

An order was placed for the first five turbines, each rated at 310,000 hp., and contracts were awarded for construction of the dam and the powerhouse access tunnels. A contract for five generators is expected to be awarded early in 1965.

Clearing of about 260 miles of the 574-mile, transmission line right-of-way from the Peace River to the Lower Mainland of British Columbia has been completed and an order placed for the supply and erection of 800 steel towers for the 200 miles between Prince George and Kelly Lake, north of Kamloops. Most of the 800 towers required for the line will be of the V-shaped, guy-supported type. Self-supported towers will be used in difficult terrain. The nominal operating voltage of the line will be 500 kv.

COLUMBIA RIVER

A news item of major importance to power engineers in 1964 was the exchange by Canada and the United States of instruments of ratification of the Columbia River Treaty and Protocol. Under the terms of the Treaty, Canada is entitled to one-half the power benefits accruing in the United States from the regulation of 15.5 million acre-feet stored in Canada behind the proposed Duncan Lake, Arrow and Mica Dams and one-half the value of the estimated flood damage prevented in the United States through operation of the proposed dams for flood control. On September 16, 1964, Canada received from the United States almost $254 million (U.S. funds)

Three 48-foot diameter tunnels divert the Peace River past the main Portage Mountain dam site.

for the 30-year sale of Canada's power entitlement on the United States portion of the Columbia River. When the Treaty projects in Canada are completed, the United States will make an additional payment of $64.4 million (U.S. funds) for flood control benefits.

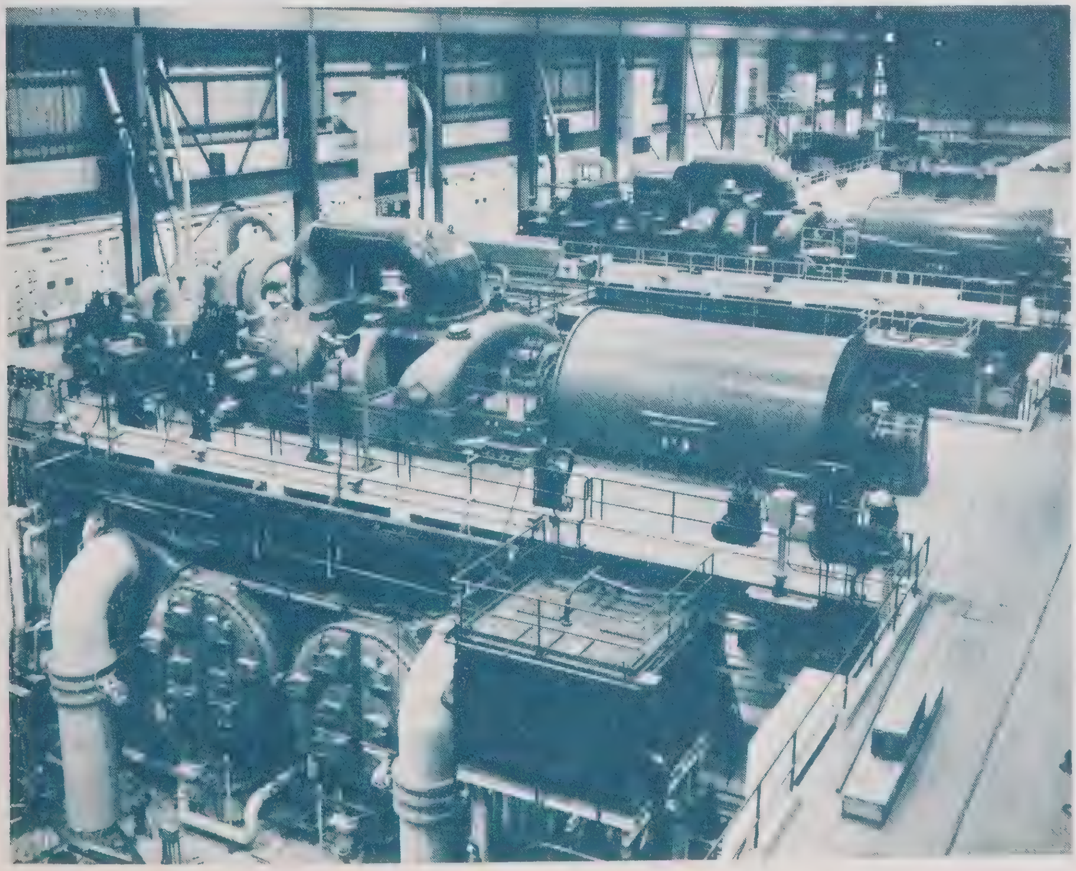
The exchange of instruments of ratification of the Treaty and Protocol by the two countries has cleared the way for construction of the three storage dams, all of which are required to be in service by 1973. The principal construction contract for the Duncan Lake project, an earth-filled dam designed to raise the level of Duncan Lake some 90 feet and to impound 1.4 million acre-feet of water, was awarded in October 1964. The project is scheduled for completion in 1968. Engineering studies, investigations, designs and construction schedules are well in hand for the Arrow Lakes project, due to be completed in 1969. The earth-filled dam at Arrow Lakes will impound 7.1 million acre-feet of water and raise the lake level approximately 80 feet. A navigation lock will be incorporated in the dam. The Canadian Pacific Railway line on the right bank of the Columbia River at the site is being relocated and provision is being made to supply water from above the dam for the operation of the Celgar Plant at Castlegar. Mica Dam, to be completed in 1973, will be one of North America's largest earth and rock-filled dams. The dam will raise the river level 600 feet and create a 90-mile-long reservoir having a storage capacity of 19 million acre-feet. Preliminary work at the Mica site, including construction of a diesel generating plant for construction power, was in progress during 1964.

In the thermal power field, the Authority expects the third 150,000-kw. unit at the Burrard generating station to go into service early in 1965. This unit was scheduled originally for November 1964. A fourth unit has been ordered and should be in service in September 1967. Ultimate capacity at Burrard is 900,000 kw. in six units.

A permit was received from National Energy Board for construction of a second transmission-line interconnection to the Bonneville Power Administration system at Blaine, Washington. The second line for ultimate operation at 500 kv., is expected to be in service by July 1965 at 230 kv.

During the year, completion of 110 miles of 230-kv. transmission line between Soda Creek and Prince George extended the presently integrated part of the Authority's system north to Prince George. In conjunction with the new line, a substation with rated capacity of 66,000 kilovolt-ampere (kva.) was placed in service at Prince George. At the Prince George diesel station, a transformer with a capacity of 15/20 mva was installed. In the Prince George area, transmission lines for initial service at 60 kv. were completed from Prince George to Willow River, from Salmon Valley to Upper Fraser and from Salmon Valley to McEwan, for a total line distance of 74 miles. Further west, 39 miles of 60-kv line from Vanderhoof to Fraser Lake to Endako Mine was well advanced at the year end. A 60-mile, 138-kv. line was completed from Dawson Creek to Chetwynd.

Two 150,000-kw. steam units at Burrard thermal station near Vancouver, British Columbia.



Tower construction on a 230-kv. transmission link between power systems in British Columbia and the State of Washington.

In the Columbia Valley, the Spillimacheen-Athalmer line, completed in 1963, was extended 40 miles to Golden. In the Cariboo, an 84-mile transmission line operating for the present at 60 kv. was built from Carquille to 70 Mile House to Boss Mountain.

On Vancouver Island at Sidney, a new 7,500 kva. substation was established. The total increase in the Authority's substation capacity in 1964 exceeded 400,000 kva.

The Authority purchased the assets of the Northern British Columbia Power Company and has operated the Company's facilities since November 1964.

ALUMINUM COMPANY OF CANADA LIMITED

Consideration is being given to the installation of another 105,600-kw., 150,000-hp. unit at the Kemano hydro-electric station. Installation of this unit, scheduled for 1966, will bring the total installed generating capacity at Kemano to 812,800 kw. in 8 units.

CITY OF REVELSTOKE

In 1964, the City completed a storage dam on the headwaters of Cranberry Creek to impound an estimated 11,800 acre-feet of water for use during periods of low flow in winter. The anticipated improvement in low flow conditions permitted the installation in 1964 of a second 4,000-kw., 5,800-hp. unit at the Walter Hardman plant on Cranberry Creek.

CONSOLIDATED MINING AND SMELTING COMPANY
OF CANADA LIMITED

The fourth unit for the Waneta plant on the Pend d'Oreille River is now on order and should go into service in mid-1966, completing the development of the Waneta site. Addition of the 76,500-kw., 120,000-hp. unit will bring the plant's total generating capacity to 292,500 kw. in four units.

A 230-kv. tie from Waneta to the U.S. Federal power system at Spokane, Washington, was completed and energized in 1964. The purpose of the tie is to firm up the output from the Cominco system during seasonal fluctuations caused by storage reservoir operations in the United States. The Canadian section of the line is 15 miles long.

The 138-kv. transmission line from Trail to Penticton, completed to Rock Creek in 1963, was extended to Oliver in 1964, a total distance of 95 miles. The line, operating at present at 60 kv. will be completed to Penticton in 1965 and operated at the higher voltage.

Alberta

A net increase of 32,830 kw. in Alberta's total installed generating capacity resulted from the installation of 34,330 kw. of new capacity and the removal from service of a 1,500-kw. plant. All of the new capacity installed was thermal.

Forecasts for 1965 indicate an installation of 153,720 kw. of hydro capacity while a total of 634,720 kw., both hydro and thermal, is scheduled for installation after 1965. Thermal capacity makes up 450,000 kw. of the latter.

CALGARY POWER LTD.

Construction of the main features of the Big Bend development on the Brazeau River is now in its final stages. At the Big Bend site, water is carried from the storage reservoir via a 12-mile canal to the penstocks which convey the water to the turbines. A pumping-generating plant is incorporated in the development at the outlet of the storage reservoir. Under operating conditions, when the reservoir storage level is higher than the water level in the main power canal, the pump-generator units will function as generators to provide additional power; when the reservoir level is lower than the canal level, the units will operate as pumps to raise water to the canal.

The first two of four penstocks are in place and the first turbine-generator unit is installed in the powerhouse. Work has started on

installation of a second unit, scheduled for service in the fall of 1966. The generator for the first unit is rated at 144,000 kw. and the turbine at 210,000 hp. The second unit will have a rated capacity of approximately 175,000 kw. and 250,000 hp.

The pumping-generating station is designed for two units, each rated at 9,720 kw. The first unit is now installed and work has started on installation of the second. Because of changes in construction schedules, power from Big Bend will not be available until the spring of 1965.

The Wabamun thermal plant is to be extended to house an additional 300,000 kw. of generating capacity for operation late in 1967. This will bring Wabamun's total capacity to 582,000 kw.

During 1964, the increase in the Company's transmission network included some 220 circuit miles of line with voltages from 66 kv. to 230 kv., and another 160 circuit miles ranging from 2 kv. to 22 kv. At the same time 112 circuit miles of line with voltages up to 50 kv. were removed from service. At the end of 1964, Calgary Power Ltd. maintained a network of lines totalling almost 6,000 circuit miles, half

Big Bend generating station under construction on the Brazeau River, Alberta.

of which is rated at 66 kv. or 132 kv. Transformer capacities at main substations were increased by a total of 83,000 kva. during the year.

CANADIAN UTILITIES LIMITED

A second 32,000-kw. coal-fired steam turbo-generator went into service in July at the Company's Battle River plant at Forestburg and tenders have been called for the turbine component of a 75,000-kw. coal-fired unit scheduled to be commissioned in July 1968.

The Company plans to move the 30,000-kw. gas turbine unit from Vermilion to the Worsley area in 1967. The Vermilion plant consists at present of the 30,000-kw. gas turbine unit and four 2,250-kw. steam units.

A feasibility study is being carried out to determine the hydro-electric potential of the Smoky River in the Grande Prairie - Peace River area. During 1964, site drilling was carried out just below the junction of the Smoky and Wabasca Rivers with encouraging results. Indications are that, with considerable river regulation, a development of about 400,000 kw. would be feasible.

A total of 75 miles of 72-kv. transmission line was completed in 1964. A new 3,000-kva. substation was built at Grand Centre and five other substations modified to provide a total increase in capacity of 49,500 kva.

NORTHLAND UTILITIES LIMITED

A net increase of 380 kw. at the Company's Jasper thermal plant resulted from the addition of a 500-kw. unit and the removal of a 120-kw. unit. The total capacity of the plant is now 2,570 kw.

Installation of a 1,200-kw. unit at High Level thermal station brought the total capacity to 1,290 kw.

Transmission lines totalling 141 miles were added during 1964, raising the Company's total to 740.3 miles.

CANADIAN SUGAR FACTORIES

Due to cessation by the Company of sugar beet processing at Raymond, the two 750-kw. diesel units at the Raymond plant have been removed. One of these units was installed at Picture Butte where the total capacity is now 2,000 kw.

CITY OF EDMONTON

A third 75,000-kw. unit is scheduled for installation in 1966 in the Edmonton thermal plant. Present capacity of the station is 330,000 kw. in 9 units.

BRITISH AMERICAN OIL COMPANY

Capacity of the Company's Rimbey steam plant is now 4,000 kw. A fourth 1,000-kw. unit was added in 1963, but was not previously reported.

EAST KOOTENAY POWER COMPANY LIMITED

The Company reports the addition of 10 miles of 69-kv. line to its transmission system in 1964 and the installation of a 600-kva. substation to serve Coleman Collieries.

ALBERTA POWER COMMISSION

The Commission's 1963 report states "the main network of farm electrification lines in Alberta is now practically complete. From now on, with very few exceptions, the additional lines to be electrified will be adjacent to existing lines".

Saskatchewan

Hydro-electric generating equipment with a total capacity of 67,000 kw. was installed in 1964. The province's total thermal capacity was reduced during the year by the small amount of 650 kw.

Although there is no indication of additions to generating capacity for 1965, a total of 272,600 kw. of new hydro capacity is scheduled to come into service after 1965.

SASKATCHEWAN POWER CORPORATION

Units 5 and 6 at the Squaw Rapids hydro station on the Saskatchewan River went into service in the spring of 1964 raising the total capacity of the station to 201,000 kw. The turbines are each rated at 46,000 hp. and the generators at 33,500 kw. Contracts have been awarded for the turbines and generators for units 7 and 8, due to be commissioned in October 1966 and April 1967 respectively. The turbines for units 7 and

Spillway structure for Squaw Rapids generating station on the Saskatchewan River.

8 will be rated at 60,000 hp. and the generators at 43,000 kw., somewhat larger than present units.

At the South Saskatchewan River project near Outlook, closure of the earth coffer dam was effected in February 1964. The total flow of the river is now being carried by diversion tunnels past the construction site where work is progressing on the main dam. Earth placement for the main dam is about 75 per cent complete and a start is expected on the filling of the reservoir in the summer of 1965. The dam and reservoir are being built by the Prairie Farm Rehabilitation Administration for irrigation purposes, but hydro-electric generating facilities will be incorporated in the project. Saskatchewan Power Corporation will install these facilities at what is known as the Coteau Creek site. First power is expected in September 1968 when two 62,200-kw. generators go into service. Plans call for the addition of a third unit of the same size early in 1969. Three of the five diversion tunnels, used for dewatering purposes at the dam, have been lined with steel and will serve as penstocks to carry water from the reservoir to the power plant.

The Corporation has investigated the feasibility of building a pumped storage project on the Anerley Lakes chain near the South Saskatchewan River Dam. The project would create a storage reservoir on the Anerley Lakes with a level about 100 feet above the level of the South Saskatchewan reservoir. Surplus hydro and thermal energy would be used during off-peak periods to pump water from the lower reservoir into the Anerley reservoir. The stored water would be released to generate power during peak load periods. Development of the Anerley Lakes project will depend upon Saskatchewan Government policy on irrigation and the recommendations of a committee studying the relative costs of peaking energy from various sources.

During the year, the Corporation completed 100 miles of 230-kv. transmission line and continued construction on another 115 miles of similar line. Almost all of the 101.9 miles of 138-kv. line and the 69.4 miles of 72-kv. line under construction in 1964 was completed by the year end. Two new substations, and increases in the capacity of seven others, resulted in a total substation capacity increase of 72,000 kva. during the year. Included in the 72,000 kva. were increases of 20,000 kva. each, at the Queen Elizabeth Power Station and at North Battleford. A 230/138-kv. switching station was constructed at the Queen Elizabeth Power Station and 138/72-kv. switching facilities were built at Tantallon, Swift Current and Chaplin.

Manitoba

There was no increase during 1964 in Manitoba's total installed generating capacity. The year 1965, however, will see the addition of 330,000 kw. of new capacity, all of which will be hydro. There are no indications of significant thermal-electric installation within the next year.

MANITOBA HYDRO

Construction at the Grand Rapids site on the Saskatchewan River continued in 1964. All structures associated with the development were expected to be completed about the end of 1964 and the first unit scheduled to go into service early in 1965. The second and third units at Grand Rapids are also scheduled to go into operation in 1965. The units, 110,000-kw. generators driven by 150,000-hp. turbines, will operate under a head of 120 feet. The spillway gates were closed in August 1964 and the forebay has been filling since then. The forebay level is expected to reach full supply level during the spring of 1965.

Energy from Grand Rapids will be carried south by two 230-kv. transmission lines to the Rosser terminal station near Winnipeg. The Rosser station went into service in December 1964. At Ashern, an intermediate point between Grand Rapids and Rosser, facilities have been installed to permit bussing of the two 230-kv. lines from Grand Rapids. Ashern will also serve as a switch point for the 230-kv. line to Vermilion, near Dauphin, and will provide transformer capacity for 66-kv. and 33-kv. sub-transmission to the area adjacent to Ashern.

An extensive program of installation of transformer and switching facilities was under way during the year. Construction of new transformer substations and extensions to existing stations boosted the total transformer capacity in the Manitoba Hydro system by 114,335 kva. A total of 353 miles of transmission line was completed in 1964 consisting

of 259 miles at 230 kv. and the remainder at voltages from 69 kv. to 115 kv. In addition, a total of 92.5 miles of 33-kv. and 66-kv. lines was erected.

Investigation of the power potential of the Nelson River continued in 1964. In May, the Governments of Canada and Manitoba signed an agreement to continue exploratory work, following which surveys and sub-surface investigations were undertaken at the Gillam Island, Limestone, Red Rock and Bladder sites, and seismic surveys were carried out at the Gillam Island, Limestone, Lower Gull, Upper Gull, Manitou and Bladder sites and at Warren Landing. Aerial photography was completed and topographic mapping undertaken to cover specified areas along the Upper Nelson River and the proposed Churchill River diversion via the Rat-Burntwood Rivers systems. Information obtained from the investigation is now being used in studies to determine the capital cost of power development at Nelson River sites.

Ontario

The rapid pace of development of power generating facilities in Ontario continued in 1964 with 300,000 kw. of thermal capacity going into service. The net increase in hydro capacity during the year was 12,125 kw.

The current schedule for electric power development in Ontario calls for the installation of nearly 5.2 million kilowatts between now and 1971. Plans for 1965 involve the installation of a total of 629,200 kw., of which 500,000 kw. will be thermal. The preponderance of thermal installation over hydro installation in Ontario is expected to continue, with the former accounting for some 4.3 million kw. of the total of 4.6 million kw. forecast for the years subsequent to 1965. It is interesting to note that 200,000 kw. of the new thermal capacity proposed for 1965 and 1,080,000 kw. subsequent to 1965 will be derived from nuclear energy.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

During 1964, the Commission's development program involved construction work on three new hydro stations and a nuclear-thermal plant, and extension of an existing conventional thermal station. A 2,875-kw. plant at Rat Rapids on the Albany River was removed from service during the year.

The hydro stations under construction are the Harmon and Kipling stations on the Mattagami River and Mountain Chute on the Madawaska River. The nuclear-thermal plant is at Douglas Point on the shore of Lake Huron and the conventional thermal station being extended is the Lakeview generating station near Toronto.

Construction in progress at Harmon generating station on the Mattagami River, Ontario.

MATTAGAMI RIVER HYDRO-ELECTRIC DEVELOPMENTS

The Harmon development, about 55 miles north of Kapuskasing, has been designed for two 64,600-kw., 94,000-hp. units with provision for two additional units. Units 1 and 2 will go into service in the summer of 1965; units 3 and 4 have not been scheduled. The power dam has been completed to the first stage of construction, including a four-unit head-works structure and a two-unit powerhouse on the west bank, two spillway chutes on the east bank, and a connecting gravity section in the river channel with short earth dikes at each end of the concrete structure. The turbines for units 1 and 2 are almost completely installed and installation of the generators is under way. Almost all of the auxiliary equipment has been delivered to the site and about ten per cent of this equipment installed.

At the site of the Kipling generating station, about three miles downstream from the Harmon plant, excavation for most of the structures has been completed and the placing of concrete is under way. A diversion section with two ports through which the entire river flow passes has been completed in an excavated channel on the east bank. Contracts have been awarded for all major items of equipment. The generating station at Kipling will house two units, each rated at 62,700 kw., and 94,000 hp., and there is provision for two additional units. Completion of units 1 and 2 is scheduled for the summer of 1966.

Flows on the Mattagami River will be augmented by a diversion from the Opasatika River. The water diverted from the Opasatika will flow through an excavated channel about 6,200 feet long, then through a series of tributaries into the Mattagami River at a point about ten miles upstream from Little Long generating station. An access road to the site has been completed and work on the channel will be completed in March 1965. The control dam on the Opasatika River is scheduled for operation in September 1965.

MOUNTAIN CHUTE HYDRO-ELECTRIC DEVELOPMENT

Preliminary work has been carried out at the Mountain Chute site on the Madawaska River. Geologic investigations for the foundations have been partly completed, a four-mile access road has been built and the power site partly cleared. The power plant at Mountain Chute will house two 80,000-kw., 112,000-hp. units due to go into operation in the fall of 1967.

CHIPPAWA POWER CANAL - NIAGARA RIVER

A project to rehabilitate and enlarge the Chippawa Power Canal is scheduled to be completed late in 1965. The Chippawa Power Canal, together with the much larger No. 2 Canal and Tunnel System placed in service in 1954, carries water diverted from the Niagara River upstream from the falls to the interconnected forebays of the Sir Adam Beck - Niagara Generating Stations Nos. 1 and 2, about five miles downstream. The canal is being enlarged by deepening the five mile upstream section and widening the one and one-half mile downstream section. The increase in the carrying capacity of the canal will permit water otherwise used at the Ontario Power and Toronto Power generating stations to be used instead at the higher-head, more efficient Sir Adam Beck stations.

Included in Ontario Hydro's program of hydro-electric power development over the next ten years are five new generating stations and extensions to three existing stations. The projects most likely to be undertaken first will be an extension to the 40,800-kw. Barrett Chute station on the Madawaska River and development of the Lower Notch site on the Montreal River, near its confluence with the Ottawa River.

THERMAL-ELECTRIC DEVELOPMENT

In the field of thermal power development, Ontario Hydro installed a third 300,000-kw. unit at the Lakeview generating station on the shore of Lake Ontario, just west of Metropolitan Toronto. Five more units are scheduled for initial operation at Lakeview between 1965 and 1968 to bring the total capacity of the station to 2,400,000 kw.

A large thermal-electric station, to be known as the Lambton

Generating Station, is to be built near Courtright, about 14 miles south of Sarnia. The station will ultimately house four 500,000-kw. units. One unit is scheduled for operation in each year from 1968 to 1971, inclusive. Contracts have been awarded for the supply and erection of the turbo-generators and boilers for all four units.

NUCLEAR THERMAL STATIONS

Installation of major components at the 200,000-kw. nuclear power station at Douglas Point is almost complete. Ontario Hydro, which is building Douglas Point station with the co-operation of Atomic Energy of Canada Limited, will purchase power from the station when it is placed in service late in 1965, but will not consider it a part of dependable resources until 1967.

The Commission has decided to proceed with the design and construction of a large nuclear plant in southern Ontario. The proposed site, on the shore of Lake Ontario a few miles east of Toronto, is subject to approval by the Atomic Energy Control Board. The preliminary schedule calls for the installation of two 540,000-kw. units, the first to be in service in 1970 and the second in 1971. The station is being

Aerial view of Lakeview thermal station on the outskirts of Metropolitan Toronto.

designed to permit eventual installation of additional units. The reactors will be of the CANDU type, similar to those used with the 20,000-kw. unit in the Nuclear Power Demonstration Station at Rolphton, Ontario, and the 200,000-kw. unit now being installed at Douglas Point. The CANDU reactor is fuelled by natural uranium and uses heavy water as a moderator and a coolant. The major responsibility for design and construction of the Fairport station will be undertaken by Ontario Hydro, with Atomic Energy of Canada limited acting in a consulting capacity.

Work continued during 1964 on the southward extension of the extra-high-voltage system which will eventually carry power from the generating stations on the Abitibi and Mattagami Rivers in the James Bay watershed, to the Toronto area. Energy from these developments is collected at the Pinard Transformer Station and since October 1963 has been fed south to the Hanmer Transformer Station near Sudbury at 230 kv. This section will be converted to 500-kv. operation in August 1965. A 174-mile section between Hanmer Transformer Station and Essa Transformer Station will be completed and in operation at 230 kv. in April 1965. A further extension of 35 miles to the Kleinburg Transformer Station near Toronto is to be completed by August 1966, when the entire 440-mile extra-high-voltage system from Pinard Transformer Station to Kleinburg Station will go into operation at 500 kv.

The total mileage of transmission lines completed during 1964 was 208 circuit miles, bringing the total line mileage in the Commission's transmission network to 18,851 circuit miles.

Five new transformer stations put into service in 1964 added 241,000 kva. of transformer capacity to the system.

GREAT LAKES POWER CORPORATION LIMITED

In December 1964, the Company completed installation of a 15,000-kw., 21,750-hp. unit at a new plant on the Montreal River. The plant, operating under a head of 78 feet, is located about six miles upstream from the mouth of the Montreal River at Lake Superior.

Québec

In 1963, the Government of Québec, through the Québec Hydro-Electric Commission, nationalized the assets of the major private power producing companies in the province. By the end of 1964, the takeover had involved forty-five electric co-operatives and three municipal electric systems. Included in the latter were the municipal systems of Ville Laprairie, Lac Mégantic and Esterel; the St. Hilaire system will

probably be taken over in January 1965. Apart from the administrative changes which have followed the provincial takeover, changes to power producing facilities have been confined to the closing down of a number of small plants supplying areas which can now be supplied more efficiently from Québec Hydro's transmission network. The major program of development of Québec's hydro power resources is going ahead on schedule.

On the basis of current information, a total of 6,426,400 kw. of new generating capacity, most of which is hydro, is either under construction or scheduled for construction. Of this total, 897,800 kw. is due to go into service in 1965.

QUÉBEC HYDRO-ELECTRIC COMMISSION

HYDRO-ELECTRIC DEVELOPMENTS

The new hydro capacity installed in 1964 went into service in two of the Commission's plants on the Ottawa River. At Carillon, four 46,750-kw., 60,000-hp. units were installed, completing the development of the station. Carillon now has a generating capacity of 654,500 kw. with a total turbine rating of 840,000 hp. in 14 units. Addition of a 12,000-kw., 16,000-hp. unit at the Rapid II hydro plant on the Upper Ottawa River brings the stations total capacity to 48,000 kw. and the total turbine capacity to 64,000 hp.

Construction of a new hydro station has been started on the Quinze River at Rapides-des-Iles. The energy will be used to supply the needs of the rapidly developing northwestern region of the province. The development will consist of four units with generators rated at 26,250 kw. each. Construction schedules call for two units to go into service in 1966; installation of the remaining two units will be subject to local demand requirements. The station will eventually be operated by remote control.

MANICOUAGAN - OUTARDES HYDRO-ELECTRIC DEVELOPMENTS

Construction work on the Manicouagan - Outardes development went ahead on schedule during the year. The Manicouagan–Outardes project is an ambitious undertaking involving the harnessing of the two rivers by constructing a series of six new hydro plants and extending the capacities of two existing stations to provide a total of over five and a half million kilowatts of new generating capacity. Engineering studies have established the feasibility of diverting runoff from a 700 square mile area of the Kaniapiskau River basin into the Manicouagan River watershed, and the proposal is now being examined from the economic point of view. Studies are being continued to determine whether runoff can be diverted from a further 2,000 square miles of the Kaniapiskau basin.

Manic 2, eleven miles from the mouth of the Manicouagan River, will be the first of the new plants to produce power. The gravity dam at Manic 2 is the largest "hollow joint" dam in the world. The design incorporates hollow cells which reduce concrete volume by 15 per cent without affecting the strength or the stability of the structure. The 230-foot head at the site will be developed by eight units, each with 127,000-kw. generators and 170,000-hp. turbines. Five units will be put into service in 1965, the sixth and seventh in 1966, with completion of the development scheduled for 1967.

Concreting is about 50 per cent complete on the buttressed, multi-arch dam at Manic 5. The dam when completed will be over 4,000 feet long and some 703 feet high at the highest point above bedrock, one of the highest and most massive dams of its kind in the world. The reservoir will have a storage capacity of 115 million acre-feet and will take an estimated eight years to fill. The diversion tunnels were closed in July 1964 and filling has commenced. The project is designed for eight generators, each rated at 168,000 kw. The turbines, operating under a head of 505 feet will be rated at 225,000 hp. each. First power from Manic 5 is expected in 1970.

Excavation for the powerhouse and penstocks at the Manic 1 site was completed in 1964. The plant, to be used for peaking purposes, will

Manic 2 development under construction on the Manicouagan River, Québec.

Work progressing under floodlights at Manic 5 on the Manicouagan River, Québec.

have a total generating capacity of 180,000 kw. in three units. The turbines, operating under 124 feet of head, will have a total capacity of 240,000 hp. The tailrace at Manic 1 is at tidewater. The plant will go into service in 1966 and will be completed in 1967.

Preliminary studies are being carried out in connection with development of the site known as Manic 3. It is expected that the first units to produce power at Manic 3 will go into service in 1972 and the final unit in 1974. The head at the site is 310 feet and the generating facilities are expected to consist of seven units with a total capacity of 1,123,000 kw. and a total turbine capacity of 1,470,000 hp.

Crews moved in during the year to prepare the Outardes 3 and 4 sites for construction. By the end of 1964, the campsite at Outardes 4 had been cleared, buildings erected and access roads completed. Construction of the diversion tunnel was commenced in October and should be completed early in the spring of 1965. The total generating capacity at Outardes 4 will be 644,000 kw. in four units with turbines totalling 824,000 hp. operating under a head of 405 feet. Present plans call for the installation of three units by November 1968 and the fourth in 1969.

An underground powerhouse planned for the Outardes 3 site will house four units consisting of 190,400-kw. generators and 260,000-hp. turbines. The head to be developed at the site is 475 feet. By December 1964, the access road to the campsite was completed and construction crews are expected to move-in early in 1965. Three units at Outardes 3 are scheduled for initial operation by November 1968 with the fourth unit scheduled for 1969.

Two existing plants will benefit from flow regulation on the two rivers. These are the Québec North Shore Paper Company's Outardes 2 (Outardes Falls) development on the Outardes River and the Manicouagan Power Company's McCormick development on the Manicouagan River. At the former, the present generating capacity of 50,000 kw. will be boosted to 440,000 kw. by the installation of three 130,000-kw., 175,000-hp. units. These new units should be in service by 1969. At the McCormick plant, installation in 1965 of two 56,250-kw., 80,000-hp. units will bring the generating capacity of the station to 303,750 kw. The McCormick and Manic 1 plants share the same headpond and in both cases the tailrace is at tidewater. Operation of the two plants will be integrated.

Energy from the Manicouagan-Outardes complex will be fed to load centres in Québec and Montreal via three 735-kv. transmission lines. The first of the new 735-kv. lines is scheduled to come into operation in 1965 when first power becomes available from Manic 2. The portion of this line between Québec City and Montreal will be routed along the south shore of the St. Lawrence River. By the end of 1964, work on tower erection was well advanced and about 70 miles of cable had been strung. Tenders for the supply of material and equipment for the second line are being called; the second line will be in service in 1966.

The Commission in 1964 removed from service the hydro plants at Montmorency Falls on the Montmorency River and at Gayhurst on the Chaudière River. The Montmorency generating station was one of the oldest in Canada. The Gayhurst plant has not produced power since April 1962 when a diversion channel was cut to carry water past the plant during the Spring flood runoff and prevent possible failure of the earth dam.

In the interests of guaranteeing adequate power supplies to meet the rapidly growing demands of industrial expansion in the province, the Commission is investigating the power potential of a number of undeveloped hydro sites. The sites being considered are on rivers draining to James Bay and Hudson Bay and on the north shore of the Lower St. Lawrence.

THERMAL-ELECTRIC DEVELOPMENT

The new steam plant at Tracy near Sorel went into operation in 1964 with one unit rated at 150,000 kw. A second unit of the same size is scheduled for service in 1965. The addition of two more units in 1967 will bring the station's total generating capacity to 600,000 kw. The capacity at Les Boules thermal plant on the south shore of the St. Lawrence River near Rimouski was reduced to 38,000 kw. when two 1,000-kw. units were taken out of service. The Commission plans to remove to the northwestern region of the province the six 6,000-kw. gas-turbine units which make up most of the remaining capacity at Les Boules. The removal operation is expected to be completed by April 1966.

Two units totalling 2,100 kw. were moved from the Rimouski plant, formerly owned by the Lower St. Lawrence Power Company, to the station at Cap aux Meules on the Magdalen Islands, leaving 2,350 kw. at Rimouski for stand-by purposes. The 6,000-kw. Hydro-Québec plant at Rimouski and the plants at Gaspé (3,000 kw.), Murdochville (3,000 kw.), Manicouagan (3,000 kw.) and New Richmond (2,050 kw.) have been withdrawn from service and are being maintained for the time being as stand-by plants.

The Commission has announced plans for the construction of a 300,000-kw., two-unit thermal plant in the Gaspé Peninsula, scheduled for service in 1970. The exact location of the plant has not yet been decided.

Extensions to Hydro-Québec's transmission network during 1964 added a total of 116 miles of line with voltages ranging from 49 to 161 kv. as follows: 31 miles at 161 kv.; 9 miles at 120 kv; 67 miles at 69 kv. and 9 miles at 49 kv. An additional total of 150 miles of rural distribution line was added. Transmission line construction at present under way or scheduled for the next few years involves a total of over 2,000 miles of line, consisting of the following: 1,208 miles at 735 kv., 292 miles at 300 kv.; 220 miles at 230 kv.; 122 miles at 161 kv.; 80 miles at 120 kv. and 105 miles at 115 kv.

New transformer substations were installed at Varennes with 250,000-kva. capacity, Joliette with 100,000 kva., Beauceville with

Tracy thermal station near Sorel, Québec.

250,000 kva. and Lachute with 20,000 kva. Distribution substations were installed at Chicoutimi with 5,000 kva. and St. Nazaire with 3,000 kva.

WABUSH MINES

The Company reports the installation of two 500-kw. diesel units at Pointe Noire to supply emergency power to the Armand pellet plant. The addition of two 150-kw. diesel units are being considered for installation in 1965 to supply emergency power to the Maintenance and Railway Shops at Pointe Noire.

DEPARTMENT OF NATURAL RESOURCES - PROVINCE OF QUÉBEC

Throughout 1964, the Québec Department of Natural Resources maintained the desired flow regulation on the North, Rivière, Gatineau, St. Maurice, Ste. Anne de Beaupré, Chicoutimi, Aux Sables, Mitis, Du Loup and St. François Rivers by the operation of a system of 30 storage dams and reservoirs.

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES - GOVERNMENT OF CANADA

The Northern Administration Branch of the Department installed a 150-kw. diesel unit at Fort Chimo, bringing the total capacity of the plant to 250 kw. Two 50-kw. diesel units were installed at Payne Bay, where the total capacity is now 130 kw.

New Brunswick

New generating capacity added in the province in 1964 was limited to 500 kw. of thermal capacity.

For 1965, 34,600 kw. of hydro and 13,340 kw. of thermal capacity are scheduled and plans for new developments subsequent to 1965 call for 600,000 kw. hydro and 100,000 kw. thermal.

NEW BRUNSWICK ELECTRIC POWER COMMISSION

Work continued on the Commission's Sisson plant on the Tobique River, scheduled for completion in September 1965. The generating capacity of the station will be 10,000 kw. in one unit; the turbine, rated at 12,500 hp., will operate under a head of 135 feet.

The first two units of the 600,000-kw. hydro plant now under

construction on the Saint John River at Mactaquac are expected to go into service in the spring of 1968. The plant, which is designed for six 100,000-kw., 140,000-hp. units will be completed by 1976.

A 60,000-kw. unit went into service late in 1963 several months ahead of schedule at the Commission's Grand Lake Thermal plant at Newcastle Creek. Not previously reported, a 2,500-kw. unit was withdrawn from service at the same plant. These two changes bring the net total generating capacity at the two Grand Lake plants to 101,250 kw.

Installation of a 500-kw. diesel unit at the Grand Harbour plant at Grand Manan accounts for the total increase in the province's installed electric generating capacity in 1964. Addition of this unit brings the generating capacity at Grand Harbour to 1,490 kw.

The Commission is adding a 13,340-kw. unit at the 47,500-kw. Courtenay Bay steam plant at East Saint John, to supply power and process steam to the Rothesay Paper Corporation. The unit will be in service in January 1965. An additional unit, rated at 100,000 kw., will be in operation in July 1966, to bring the total capacity of this station to 160,840 kw.

The Commission's transmission network was extended during the year by 72 miles of 138-kv. line and 60 miles of 69-kv. line. A further 100 miles of 138-kv. line and 24 miles of 69-kv. line is under construction. A total of 100 miles of rural distribution lines was completed in 1964. Eight new transformer sub-stations completed or under construction during the year will provide 337,000 kva. of additional capacity.

Artist's conception of Mactaquac hydro development on the Saint John River, New Brunswick.

Courtenay Bay thermal station at East Saint John, New Brunswick.

MAINE AND NEW BRUNSWICK ELECTRIC POWER COMPANY LIMITED

Work is progressing at the Tinker hydro station on the Aroostook River on the installation of a 24,600-kw., 33,000-hp. unit, due for service in April 1965. Addition of this unit will more than triple the station's present total capacity of 10,040 kw.

A 69-kv. transmission line, about two miles long, was completed from the Tinker station to the International Boundary, and a 42,500-kva. transformer station put into service at Aroostook Junction.

Nova Scotia

Nova Scotia's total installed generating capacity remained unchanged in 1964. Plans for 1965, however, involve the installation of 103,750 kw. of thermal capacity, with a further 36,000 kw. scheduled for early in 1966. A total of 16,200 kw. of hydro capacity is proposed for installation during the period 1968-1970. Two other hydro sites at present under consideration could yield as much as 75,000 kw.

NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED

A 100,000-kw. unit is expected to be brought into initial service in July 1965 at the Company's Tufts Cove Thermal plant at Dartmouth. This is the first unit in a multi-unit development which may eventually have a capacity exceeding 500,000 kw.

The Company is actively considering the development of two hydro sites expected to provide a total of 16,200 kw. of generating capacity. The sites are at Lequille on the Allain (Lequille) River and at Alpena on the Nictaux River. At Lequille, the plant would be designed for a generating capacity of 11,200 kw. with a 15,000-hp. turbine operating under a 370-foot head. Estimated in-service date is 1970. At Alpena the generator would be rated at 5,000 kw. and the turbine at 6,500 hp. under a 60-foot head. Estimated date of completion for the Alpena plant is 1968.

The Company's transmission network was extended in 1964 by the addition of 13.25 miles of 69-kv. line. A further 11 miles of 69-kv. line is under construction. A total of 8.3 miles of rural distribution line was added during the year.

NOVA SCOTIA POWER COMMISSION

The Commission is considering the construction of two hydro-electric developments at Riverdale on the Sissiboo River and at Wreck Cove on Wreck Cove Brook. There is no indication as yet of when the construction of either development will commence. Present plans for the Riverdale development call for the installation of a single 6,000-kw. unit operating under a 90-foot head, while estimates for the Wreck Cove plant indicate a possible ultimate capacity of 67,500 kw.

Transmission line mileage added during 1964 amounted to 20 miles at 69 kv. and an additional 11.2 miles of rural distribution line. A total of 34 miles of 138-kv. line and 33.1 miles of 69-kv. line is under construction. Transformer capacity in the Commission's system was increased by 42,000 kva.

SEABOARD POWER CORPORATION LIMITED

The capacity of the Corporation's 72,000-kw. steam plant at Glace Bay is being increased by the addition of a 36,000-kw. unit, scheduled for operation early in 1966. The additional unit, which will be owned by Nova Scotia Power Commission, will supply power to the new heavy water plant now under construction in this area.

The Corporation reports the addition of 3.5 miles of 22-kv. line in 1964.

IMPERIAL OIL COMPANY

The Company's new thermal plant now under construction at Dartmouth is expected to be in service in June 1965. Capacity of the plant will be 3,750 kw. in one unit.

Newfoundland

Thermal capacity amounting to 6,610 kw. went into service in Newfoundland in 1964. Offsetting this was the dismantling of a 7,850-kw. plant following the shutting down of mining activities which were served by that plant. The province's total of installed hydro capacity remained unchanged.

Forecasts for 1965 indicate a total increase of 1,720 kw. in existing thermal capacity. First power from a 459,000-kw. hydro development is due in 1967.

NEWFOUNDLAND AND LABRADOR POWER COMMISSION

The Government of Newfoundland has announced a decision to proceed with development of the important hydro-electric power site on the Salmon River at Bay d'Espoir and has given responsibility for developing the site to the Newfoundland and Labrador Power Commission.

The generating capacity to be installed at Bay d'Espoir will total 459,000 kw. in six units, with turbines totalling 600,000 hp. By the end of 1967, three of the units will be in service. Contracts covering preliminary construction work at the site and clearing for transmission line rights-of-way have already been awarded, and work is under way.

The Commission's program of hydro development on the island of Newfoundland includes the building of an island-wide transmission grid consisting basically of a 230-kv. east-west "backbone" with 138-kv. extensions. This grid is designed to interconnect all the existing power generating sources on the Island and in 1967 will carry hydro power from the Bay d'Espoir development.

In rural electrification, the Commission has set up a program of Power Distribution Districts in the province. Under the new system, each District is enabled to borrow capital for the construction of rural electrical distribution facilities. Some fifty Power Distribution Districts were formed during the year. Plans for these Districts call for the construction of some 800 miles of distribution line and 27 diesel plants. In 1964, the Commission put into service a total of 1,600 kw. of new capacity at ten small diesel plants and started work on another 1,720 kw. for service in 1965 at ten other locations.

Transmission lines installed during the year amounted to a total of 205 miles, 7 miles of which was energized at 25 kv., 28 miles at 14.4 kv., 7 miles at 12.5 kv., and 163 miles at 7.2 kv. Under construction were a further 275 miles of line, including 100 miles at 25 kv., 35 miles at 14.4 kv., 80 miles at 12.5 kv. and 60 miles at 7.2 kv.

Rural distribution lines completed in 1964 amounted to 45 miles.

HAMILTON FALLS POWER CORPORATION LIMITED

In Labrador, plans for the development of Grand Falls on the Hamilton River have been delayed pending the outcome of discussions aimed at reaching agreement on possible transmission routes to potential markets.

For full development of the head of 1,040 feet at Grand Falls, the Corporation proposes an installation of ten units, each rated at 391,400 kw. and 615,000 hp.

Grand Falls on the Hamilton River, recently re-named Churchill Falls on the Churchill River.

UNITED TOWNS ELECTRIC COMPANY LIMITED

The Company in the spring of 1964 completed construction of a new thermal plant at Salt Pond, near Burin on Burin Peninsula. The plant houses three diesel units, each rated at 500 kw. At Grand Bank, addition of a 300-kw. unit brought the station's capacity to 865 kw. and addition of a 300-kw. unit at Port aux Basques brought the station capacity to 1,935 kw.

The Company is constructing 9 miles of 23-kv. transmission line between the towns of Lawn and St. Lawrence.

TWIN FALLS CORPORATION

In 1964, the Corporation completed 110 miles of 230-kv. transmission line from Twin Falls to Wabush Lake.

NEWFOUNDLAND LIGHT AND POWER COMPANY LIMITED

The Company is constructing a 97-mile, 138-kv. transmission line from Come-by-Chance to Gander. The line was originally planned to extend from St. John's to Gander at 66 kv. The Newfoundland and Labrador Power Commission will build the section from St. John's to Come-by-Chance with a line voltage of 230 kv.

BRITISH NEWFOUNDLAND EXPLORATION LIMITED (WHALESBACK DIVISION)

A new thermal plant with a capacity of 1,910 kw. in four units was put into service in 1964 at Whalesback near Springdale.

UNION ELECTRIC LIGHT AND POWER COMPANY LIMITED

The Company added 500 kw. in two units in 1964 at its plant in Clarenville.

GULLBRIDGE MINES LIMITED

A new plant consisting of a 500-kw. unit was completed at Gull Pond near Badger during the year.

Yukon and Northwest Territories

New generating capacity installed in 1964 in the Territories was limited to 570 kw. of thermal capacity. On the basis of current information, however, power generating facilities with a total capacity of 18,500 kw. will go into service in 1965.

NORTHERN CANADA POWER COMMISSION

Construction work continued on schedule at the Twin Gorges site on the Taltson River, some 35 miles northeast of Fort Smith, N.W.T. The 18,000-kw., 25,000-hp. single-unit plant is due to go into service in December 1965.

In 1964, the Commission installed a 300-kw. diesel unit for stand-by purposes at Mayo. Planned for 1965 are two 250-kw. diesel units at Fort McPherson to bring the total capacity at that plant to 980 kw. There is some possibility that by 1966 growing power demands at Inuvik will require the addition of about 1,000 kw. of new generating capacity.

YUKON ELECTRICAL COMPANY LIMITED

In 1964, the Company installed a 110-kw. diesel plant, consisting of two 40-kw. and one 30-kw. units at Old Crow, Yukon Territory, about 75 miles north of the Arctic circle.

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES, GOVERNMENT OF CANADA

The Northern Administration Branch increased the capacity of the Fort Rae diesel plant to 180 kw. by the addition of three units totalling 120 kw. A 40-kw. unit was added at Fort Liard to bring the total capacity to 65 kw.

TABULAR SUMMARY - HYDRO

DEVELOPMENT	RIVER	HYDRO-ELECTRIC CAPACITY: INSTALLED DURING 1964: No. of Units	INSTALLED DURING 1964: Total Turbine Capacity hp.	INSTALLED DURING 1964: Total Generator Capacity kw.	TOTAL STATION CAPACITY AT END 1964: Turbine hp.	TOTAL STATION CAPACITY AT END 1964: Generator kw.	PROPOSED FOR INSTALLATION IN 1965: No. of Units	IN 1965: Total Turbine Capacity hp.	IN 1965: Total Generator Capacity kw.	AFTER 1965: No. of Units	AFTER 1965: Total Turbine Capacity hp.	AFTER 1965: Total Generator Capacity kw.	REMARKS
British Columbia													
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY													
Portage Mountain	Peace									10	3,100,000	2,270,000	
ALUMINUM COMPANY OF CANADA													
Kemano	Nechako to Kemano				1,050,000	707,200				1	150,000	105,600	
CITY OF REVELSTOKE													
Walter Hardman	Cranberry Creek				5,800	4,000	1	5,800	4,000				
CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED													
Waneta	Pend d'Oreille				370,000	216,000				1	120,000	76,500	Scheduled for mid-1966.
TOTAL								5,800	4,000		3,370,000	2,452,100	
Alberta													
CALGARY POWER LTD.													
Big Bend	Brazeau						1	210,000	144,000	1	250,000	175,000	
Pumping-Generating	Brazeau						1	12,500	9,720	1	12,500	9,720	
TOTAL								222,500	153,720		262,500	184,720	

Saskatchewan

SASKATCHEWAN POWER CORP.													
Squaw Rapids	Saskatchewan	2	92,000	67,000	276,000	201,000				2	120,000	86,000	
Coteau Creek	South Saskatchewan									3	252,000	186,600	
TOTAL			92,000	67,000							372,000	272,600	

Manitoba

MANITOBA HYDRO													
Grand Rapids	Saskatchewan	1	150,000	110,000	150,000	110,000	2	300,000	220,000				
TOTAL			150,000	110,000				300,000	220,000				

Ontario

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO													
Harmon	Mattagami						2	188,000	129,200				Provision for two additional units.
Kipling	Mattagami									2	188,000	125,400	Provision for two additional units.
Little Long	Mattagami				168,000	121,600							Provision for two additional units.
Otter Rapids	Abitibi				240,000	174,800							Provision for four additional units.
Mountain Chute	Madawaska									2	224,000	160,000	
Rat Rapids	Albany												Plant consisting of 3,150 hp., 2,875 kw. in two units removed from service.
GREAT LAKES POWER CORPORATION LIMITED													
Hogg	Montreal	1	21,750	15,000	21,750	15,000							
TOTAL			21,750	15,000	(new capacity)								
			3,150	2,875	(removed from service)			188,000	129,200		412,000	285,400	
			18,600	12,125	(net increase)								

DEVELOPMENT	RIVER	HYDRO-ELECTRIC CAPACITY: INSTALLED DURING 1964			TOTAL STATION CAPACITY AT END 1964		PROPOSED FOR INSTALLATION: IN 1965			AFTER 1965			REMARKS
		No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	Turbine hp.	Generator kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity hp.	

Quebec

DEVELOPMENT	RIVER	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	Turbine hp.	Generator kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity hp.	REMARKS
QUÉBEC HYDRO-ELECTRIC COMMISSION													
Carillon	Ottawa	4	240,000	187,000	840,000	654,500							
Rapid II	Ottawa (Upper)	1	16,000	12,000	64,000	48,000							
Manic 5	Manicouagan									8	1,800,000	1,344,000	First power in 1970.
Manic 2	Manicouagan						5	850,000	635,000	3	510,000	381,000	Sixth and seventh units in service 1966, with completion scheduled for 1967.
Manic 3	Manicouagan									7	1,470,000	1,123,000	First power expected in 1972 and final unit scheduled for 1974.
Manic 1	Manicouagan									3	240,000	180,000	First two units scheduled for 1966 and the third unit for 1967.
Outardes 4	Outardes									4	824,000	644,000	Three units expected to be in operation by November 1968 and the fourth in 1969.
Outardes 3	Outardes									4	1,040,000	761,600	Three units scheduled to be in operation by November 1968 and the fourth in 1969.
Rapides-des-Îles	Rivières-des-Quinze									4	200,000	105,000	First two units scheduled to become operational in 1966.
QUÉBEC NORTH SHORE PAPER COMPANY													
Outardes 2	Outardes				70,600	50,000				3	525,000	390,000	Scheduled for service in 1969.
MANICOUAGAN POWER COMPANY													
McCormick	Manicouagan				292,400	191,250	2	160,000	112,500				
QUÉBEC POWER COMPANY													
Montmorency Falls	Montmorency												4,400-hp., 2,100-kw. plant abandoned 1964.

CITY OF MEGANTIC													
Gayhurst	Chaudière												4,500-hp., 3,200-kw. plant abandoned 1964.
TOTAL			256,000	199,000	(new capacity)			1,010,000	747,500		6,609,000	4,928,600	
			8,900	5,300	(removed from service)								
			247,100	193,700	(net increase)								

New Brunswick

NEW BRUNSWICK ELECTRIC POWER COMMISSION													
Sisson	Tobique						1	12,500	10,000				
Mactaquac	Saint John									6	840,000	600,000	Two units scheduled for service early in 1968, the remaining units by 1976.
MAINE AND NEW BRUNSWICK ELECTRIC POWER COMPANY LTD.													
Tinker	Aroostook				14,000	10,040	1	33,000	24,600				
TOTAL								45,500	34,600		840,000	600,000	

Nova Scotia

NOVA SCOTIA POWER COMMISSION													
Riverdale	Sissiboo												Installation of single unit, 8,000-hp., 6,000-kw. plant under consideration.
Wreck Cove	Wreck Cove Brook												Installation of 67,500 kw. under consideration.
NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED													
Alpena	Nictaux									1	6,500	5,000	Estimated for 1968.
Lequille	Allain (Lequille)									1	15,000	11,200	Estimated for 1970.
TOTAL											21,500	16,200	

DEVELOPMENT	RIVER	HYDRO-ELECTRIC CAPACITY: Installed during 1964: No. of Units	Installed during 1964: Total Turbine Capacity hp.	Installed during 1964: Total Generator Capacity kw.	Total Station Capacity at End 1964: Turbine hp.	Total Station Capacity at End 1964: Generator kw.	Proposed for Installation in 1965: No. of Units	Proposed for Installation in 1965: Total Turbine Capacity hp.	Proposed for Installation in 1965: Total Generator Capacity kw.	Proposed for Installation after 1965: No. of Units	Proposed for Installation after 1965: Total Turbine Capacity hp.	Proposed for Installation after 1965: Total Generator Capacity kw.	REMARKS
Newfoundland													
NEWFOUNDLAND AND LABRADOR POWER COMMISSION													
Bay d'Espoir	Salmon									6	600,000	459,000	First power in 1967 when three units are scheduled for initial operation.
TOTAL											600,000	459,000	
Northwest Territories													
NORTHERN CANADA POWER COMMISSION													
Twin Gorges	Taltson						1	25,000	18,000				
TOTAL								25,000	18,000				
NET TOTAL FOR **Canada**													

TABULAR SUMMARY - THERMAL

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY: INSTALLED DURING 1964: No. of Units	INSTALLED DURING 1964: Total Capacity kw.	TOTAL STATION CAPACITY AT END 1964 kw.	PROPOSED FOR INSTALLATION IN 1965: No. of Units	PROPOSED FOR INSTALLATION IN 1965: Total Capacity kw.	PROPOSED FOR INSTALLATION AFTER 1965: No. of Units	PROPOSED FOR INSTALLATION AFTER 1965: Total Capacity kw.	REMARKS
British Columbia									
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY									
Burrard	S			300,000	1	150,000	3	450,000	
TOTAL						150,000		450,000	
Alberta									
CALGARY POWER LTD.									
Wabamun	S			282,000			1	300,000	
CANADIAN UTILITIES LIMITED									
Battle River	S	I	32,000	64,000			1	75,000	
NORTHLAND UTILITIES LIMITED									
High Level	IC	1	1,200	1,290					
Jasper	IC	1	500	2,570					A 120-kw. unit was removed from service resulting in a net gain of 380 kw.
CANADIAN SUGAR FACTORIES									
Raymond									Plant consisting of two 750-kw. units dismantled.
Picture Butte	IC		750	2,000					One 750-kw. unit transferred from Raymond.

CITY OF EDMONTON									
Edmonton				330,000				75,000	
BRITISH AMERICAN OIL COMPANY									
Rimbey				4,000					One unit of 1,000 kw., not previously reported, installed during 1963.
TOTAL			34,450	(new capacity)					
			1,620	(removed from service)				450,000	
			32,830	(net increase)					

Saskatchewan

NORTHLAND UTILITIES LIMITED									
Uranium City	IC								650-kw. plant removed from service.
TOTAL			-	(new capacity)					
			650	(removed from service)					
			650	(net decrease)					

Ontario

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO									
Lakeview	S	1	300,000	900,000	1	300,000	4	1,200,000	Plant scheduled for completion in 1968 with a total of 8 units.
Lambton	S						4	2,000,000	One unit scheduled for initial operation in each year from 1968 to 1971.
Douglas Point	N				1	200,000			Being built by the Commission in co-operation with Atomic Energy of Canada Limited.
Fairport	N						2	1,080,000	To be built by the Commission in co-operation with Atomic Energy of Canada Limited. One unit scheduled for operation in 1970, the second in 1971.
TOTAL			300,000			500,000		4,280,000	

IC - Internal Combustion, S - Steam, N - Nuclear

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY: INSTALLED DURING 1964		TOTAL STATION CAPACITY AT END 1964 kw.	PROPOSED FOR INSTALLATION: IN 1965		AFTER 1965		REMARKS
		No. of Units	Total Capacity kw.		No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	
Quebec									
QUÉBEC HYDRO-ELECTRIC COMMISSION									
Tracy	S	1	150,000	150,000	1	150,000	2	300,000	Last two units scheduled for 1967.
Les Boules	IC & GT			38,000					Two 1,000-kw. units removed from service.
Gaspé Peninsula							2	300,000	Due to come into service in 1970.
WABUSH MINES									
Pointe Noire	IC	2	1,000	1,000	2	300			
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES, GOVERNMENT OF CANADA									
Fort Chimo	IC	1	150	250					
Payne Bay	IC	2	100	130					
TOTAL			151,250	(new capacity)		150,300		600,000	
			2,000	(removed from service)					
			149,250	(net increase)					
New Brunswick									
NEW BRUNSWICK ELECTRIC POWER COMMISSION									
Grand Harbour			500	1,490					
Courtenay Bay				47,500	1	13,340	1	100,000	The 100,000-kw. unit is scheduled for operation in 1966.
TOTAL			500			13,340		100,000	

Nova Scotia

NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED									
Tufts Cove					1	100,000			
IMPERIAL OIL LIMITED									
Dartmouth					1	3,750			
SEABOARD POWER CORPORATION LTD.									
Glace Bay				72,000			1	36,000	Scheduled for operation early in 1966.
TOTAL						103,750		36,000	

Newfoundland

UNITED TOWNS ELECTRIC COMPANY LTD.									
Salt Pond	IC	3	1,500	1,500					
Grand Bank	IC	1	300	865					
Port aux Basques	IC	1	300	1,935					
BRITISH NEWFOUNDLAND EXPLORATION LIMITED									
Whalesback	IC	4	1,910	1,910					
NEWFOUNDLAND AND LABRADOR POWER COMMISSION									
	IC		1,600						Represents the total of new capacity installed in 1964 at ten small diesel plants in various locations.
	IC					1,720			Represents the total capacity to be added at ten other diesel plants in various locations.

IC - Internal Combustion, GT - Gas Turbine, S - Steam

THERMAL - ELECTRIC CAPACITY

DEVELOPMENT	Type	INSTALLED DURING 1964		TOTAL STATION CAPACITY AT END 1964 kw.	PROPOSED FOR INSTALLATION				REMARKS
					IN 1965		AFTER 1965		
		No. of Units	Total Capacity kw.		No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	
Newfoundland (CONT'D)									
FIRST MARITIME MINING CORPORATION LIMITED									
Tilt Cove									8,850-kw. plant removed from service. 1,000 kw. of this capacity installed at Gull Pond near Badger.
UNION ELECTRIC LIGHT AND POWER COMPANY LIMITED									
Clarenville	IC	2	500	825					
GULLBRIDGE MINES LIMITED									
Gull Pond	IC	1	500	500					
TOTAL			6,610	(new capacity)					
			7,850	(removed from service)		1,720			
			1,240	(net decrease)					
Yukon									
YUKON ELECTRICAL COMPANY LIMITED									
Old Crow	IC	3	110	110					
TOTAL			110						

Northwest Territories

NORTHERN CANADA POWER COMMISSION									
Fort McPherson	IC			480	2	500			
Mayo	IC	1	300	300					
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES, GOVERNMENT OF CANADA									
Fort Rae	IC	3	120	180					
Fort Liard	IC	1	40	65					
TOTAL			460			500			
NET TOTAL FOR **Canada**			481,260			917,890		5,916,000	

IC - Internal Combustion.

ELECTRIC POWER GENERATING STATIONS


HYDRO

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.

British Columbia

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Kemano	Nechako to Kemano	ALCAN	1954	1958	2,500	4	150,000		97,600	
							3	150,000	1,050,000	105,600	707,200
2	Bridge River No. 2	Bridge to Seton Lake	BCHPA	1959	1960	1,264	4	82,000	328,000	62,000	248,000
3	Waneta	Pend d'Oreille	CMSC	1954	1963	210	1	130,000		72,000	
							2	120,000	370,000	72,000	216,000
4	Bridge River No. 1	Bridge to Seton Lake	BCHPA	1948	1954	1,264	4	69,000	276,000	45,000	180,000
5	Cheakamus	Cheakamus to Squamish	BCHPA	1957	1957	954	2	95,000	190,000	70,000	140,000
6	John Hart	Campbell	BCHPA	1947	1953	390	6	28,000	168,000	20,000	120,000
7	Ruskin	Stave	BCHPA	1930	1950	123	3	47,000	141,000	35,200	105,600
8	Brilliant	Kootenay	CMSC	1944	1949	90	3	37,000	111,000	27,200	81,600
9	Wahleach	Wahleach Lake to Fraser	BCHPA	1952	-	1,880	1	82,000	82,000	60,000	60,000
10	Upper Bonnington	Kootenay	CMSC	1907	1940	70	2	8,000		5,062	
							2	9,000		6,750	
							2	26,000	86,000	15,750	55,124
11	Ladore Falls	Campbell	BCHPA	1956	1957	122	2	35,000	70,000	27,000	54,000
12	Stave Falls	Stave	BCHPA	1912	1925	110	4	13,000		10,500	
						113	1	15,000	67,000	10,500	52,500
13	Lake Buntzen No. 1	Lake Buntzen to Burrard Inlet	BCHPA	1951	-	380	1	70,000	70,000	50,000	50,000
14	South Slocan	Kootenay	CMSC	1928	1929	70	3	25,000	75,000	15,750	47,250
15	Lower Bonnington	Kootenay	WKPL	1925	1926	70	3	20,000	60,000	15,750	47,250
16	Seton	Seton Creek	BCHPA	1956	-	147	1	58,500	58,500	42,000	42,000
17	Corra Linn	Kootenay	CMSC	1932	1932	53	3	19,000	57,000	13,500	40,500
18	Stillwater	Lois	MBPR	1930	1948	-	2	25,000	50,000	18,000	36,000
19	Whatshan	Whatshan	BCHPA	1951	1956	690	3	16,500	49,500	11,250	33,750
20	Strathcona	Campbell	BCHPA	1958	-	140	1	42,000	42,000	33,750	33,750
21	Clowhom Falls	Clowhom	BCHPA	1958	-	145	1	40,000	40,000	30,000	30,000
22	Pluntledge	Pluntledge	BCHPA	1955	-	340	1	35,000	35,000	27,000	27,000
23	Lake Buntzen No.2	Lake Buntzen to Burrard Inlet	BCHPA	1913	1919	380	3	13,500	40,500	8,900	26,700
24	Jordan River	Jordan	BCHPA	1911	1931	1,010	2	5,430		3,200	
							1	10,125		8,000	
							1	18,000	38,985	12,000	26,400
25	Ash River	Ash	BCHPA	1959	-	735	1	35,000	35,000	25,200	25,200
26	La Joie	Bridge	BCHPA	1957	-	176	1	30,000	30,000	22,000	22,000
27	Powell River	Powell	MBPR	1911	1926	157	1	13,500		12,000	
						147	1	3,600		3,750	
						147	2	3,000	23,100	2,800	21,350
28	Ocean Falls	Link	CZC	1917	1932	150	2	2,100		1,720	
							2	6,300	16,800	4,200	11,840

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
BRITISH COLUMBIA (Cont'd)											
29	Elko	Elk	EKPC	1924	1924	190	2	7,500	15,000	4,800	9,600
30	Falls River	Big Falls Creek	BCHPA	1930	1960	248	2	6,000	12,000	4,800	9,600
31	Nelson	Kootenay	CN	1907	1950	60	1	1,670		750	
						60	1	1,900		1,000	
						70	1	3,000		2,120	
						70	1	6,750	13,320	4,800	8,670
32	Alouette	Alouette Lake to Stave Lake	BCHPA	1928	-	125.5	1	12,500	12,500	8,000	8,000
33	Beach	Britannia Creek	ACL	1916	1917	1,835	2	3,750		2,000	
		Furry Creek				760	1	3,750	11,250	2,000	6,000
34	Shuswap Falls	Shuswap	BCHPA	1929	1942	72	1	3,800		2,400	
						82	1	4,000	7,800	2,800	5,200
35	Aberfeldie	Bull	EKPC	1922	1922	275	2	3,650	7,300	2,500	5,000
36	Spillimacheen	Spillimacheen	BCHPA	1955	1955	207	2	1,200		956	
							1	3,000	5,400	2,200	4,112
37	Walter Hardman	Cranberry Creek	COR	1960	-	770	1	5,800	5,800	4,000	4,000
38	Woodfibre	Woodfibre Creek	RC	1947	-	920	1	3,650	3,650	2,250	2,250
39	Port Alice	Victoria Lake to Neroutsos Inlet	RC	1953	-	425	1	3,200	3,200	2,000	2,000
40	Diversion	Jordan	BCHPA	1928	-	45-82	1	2,250	2,250	1,500	1,500
Total capacity of plants under 1,500 kw.									9,208		5,787
Total capacity of turbines connected directly to mechanical equipment									41,710		
Total (all plants)									3,810,773		2,612,733

Alberta

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Spray	Spray Diversion	CP	1951	1960	875	2	62,000	124,000	40,400	80,800
2	Rundle	Spray Diversion	CP	1951	1960	318	1	23,000		17,000	
						317	1	40,000	63,000	29,750	46,750
3	Ghost	Bow	CP	1929	1954	105	2	18,000		12,750	
						92	1	30,000	66,000	21,150	46,650
4	Cascade	Cascade	CP	1942	1957	320	2	23,000	46,000	17,000	34,000
5	Horseshoe	Bow	CP	1953	1955	72	2	4,680		3,375	
							2	7,500	24,360	5,625	18,000
6	Kananaskis	Bow	CP	1913	1951	68	2	6,000		3,400	
						70	1	12,000	24,000	9,560	16,360
7	Bearspaw	Bow	CP	1954	-	48	1	20,750	20,750	15,300	15,300
8	Pocaterra	Kananaskis	CP	1955	-	185	1	18,400	18,400	13,500	13,500
9	Barrier	Kananaskis	CP	1947	-	135	1	13,500	13,500	9,560	9,560
10	Interlakes	Kananaskis	CP	1955	-	98	1	6,900	6,900	5,040	5,040
11	Three Sisters	Spray Diversion	CP	1951	-	50	1	3,600	3,600	3,400	3,400
Total capacity of plants under 1,500 kw.									1,940		1,430
Total capacity of turbines connected directly to mechanical equipment									-		
Total (all plants)									412,450		290,790

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.

Saskatchewan

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Squaw Rapids	Saskatchewan	SPC	1963	1964	107	6	46,000	276,000	33,500	201,000
2	Island Falls	Churchill	CRPC	1930	1959	56	3	16,500		11,880	
							3	19,000		18,000	
							1	19,000	125,500	17,100	106,740
3	Waterloo Lake	Charlot	EMR	1961	-	63	1	10,000	10,000	7,800	7,800
4	Wellington Lake	Charlot	CMSC	1939	1960	70	2	3,300	6,600	2,400	4,800
	Total capacity of plants under 1,500 kw.								-		-
	Total capacity of turbines connected directly to mechanical equipment								-		
	Total (all plants)								418,100		320,340

Manitoba

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Kelsey	Nelson	MH	1960	1961	50	5	42,000	210,000	33,750	168,750
2	Seven Sisters	Winnipeg	MH	1931	1952	66	6	33,333	225,000	27,625	165,750
3	Great Falls	Winnipeg	MH	1923	1928	58	6	28,000	168,000	18,900	113,400
4	Pine Falls	Winnipeg	MH	1951	1952	37	6	19,000	114,000	13,950	83,700
5	Slave Falls	Winnipeg	CW	1931	1948	30	8	12,000	96,000	9,000	72,000
6	Pointe du Bois	Winnipeg	CW	1911	1925	45	5	5,200		3,000	
							3	6,800		5,000	
							3	6,900		5,200	
							3	7,300		5,200	
							2	8,000	105,000	5,200	71,600
7	McArthur Falls	Winnipeg	MH	1954	1955	23	8	10,000	80,000	7,650	61,200
8	Laurie River No. 2	Laurie	SGM	1958	-	55	1	7,000	7,000	5,400	5,400
9	Laurie River No. 1	Laurie	SGM	1950	1952	55	2	3,500	7,000	2,475	4,950
	Total capacity of plants under 1,500 kw.								-		-
	Total capacity of turbines connected directly to mechanical equipment								-		
	Total (all plants)								1,012,000		746,750

Ontario

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Sir Adam Beck - Niagara: Generating Station No. 1	Niagara	HEPCO	1922	1930	305	5	55,000		36,000	
						294	2	58,000		43,200	
						294	1	58,000		44,000	
						294	2	58,000	565,000	46,750	403,900
	Generating Station No. 2			1954	1958	292	16	105,000	1,680,000	76,475	1,223,600
	Pumping-Generating Station			1957	1958	85	6	46,000	276,000	29,450	176,700
2	Robert H. Saunders - St. Lawrence	St. Lawrence	HEPCO	1958	1959	81	16	75,000	1,200,000	57,000	912,000

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
3	Des Joachims	Ottawa	HEPCO	1950	1951	130	8	62,000	496,000	45,000	360,000
4	Abitibi Canyon	Abitibi	HEPCO	1933	1959	237	4	66,000		41,225	
							1	66,000	330,000	43,200	208,100
5	Otto Holden	Ottawa	HEPCO	1952	1953	77	4	35,000		25,650	
							4	33,000	272,000	25,650	205,200
6	Otter Rapids	Abitibi	HEPCO	1961	1963	107	4	60,000	240,000	43,700	174,800
7	Ontario Power	Niagara	HEPCO	1905	1919	-	3	11,700		7,500	
							4	11,700		8,770	
							7	13,400		8,775	
							1	20,000	195,700	13,500	132,505
8	Pine Portage	Nipigon	HEPCO	1950	1954	105	2	41,000		29,700	
							2	45,000	172,000	34,650	128,700
9	Chenaux	Ottawa	HEPCO	1950	1951	40	8	21,000	168,000	15,300	122,400
10	Little Long	Mattagami	HEPCO	1963	1963	90	2	84,000	168,000	60,800	121,600
11	DeCew Falls No. 2	Welland Canal	HEPCO	1943	1947	280	2	75,000	150,000	57,600	115,200
12	Rankine	Niagara	CNPC	1904	1924	133	5	10,250		7,500	
							2	12,500		9,375	
							3	10,750		9,375	
							1	12,000	120,500	10,300	94,675
13	Toronto Power	Niagara	HEPCO	1906	1915	-	7	15,000		9,000	
							4	13,000	157,000	7,200	91,800
14	Chats Falls	Ottawa	HEPCO	1931	1931	53	4	28,000	112,000	22,325	89,300
15	Caribou Falls	English	HEPCO	1958	1958	58	3	34,000	102,000	25,650	76,950
16	Cameron Falls	Nipigon	HEPCO	1920	1958	72	2	12,500		9,540	
						72	4	12,500		8,480	
						73	1	25,000	100,000	19,000	72,000
17	Manitou Falls	English	HEPCO	1956	1958	54	5	18,500	92,500	14,400	72,000
18	Alexander	Nipigon	HEPCO	1930	1958	60	3	18,000		12,750	
						58	2	19,000	92,000	13,500	65,250
19	Whitedog Falls	Winnipeg	HEPCO	1958	1958	50	3	27,000	81,000	21,600	64,800
20	Stewartville	Madawaska	HEPCO	1948	1948	148	3	28,000	84,000	20,400	61,200
21	Smoky Falls	Mattagami	SFPPC	1928	1931	-	4	18,750	75,000	13,200	52,800
22	Silver Falls	Kaministikwia	HEPCO	1959	-	330	1	60,000	60,000	45,000	45,000
23	Geo. W. Rayner	Mississagi	HEPCO	1950	1950	210	2	29,000	58,000	21,150	42,300
24	Barrett Chute	Madawaska	HEPCO	1942	1942	150	2	28,000	56,000	20,400	40,800
25	Upper Falls	Montreal	GLPC	1937	1957	232	2	12,600		9,000	
							1	31,000	56,200	22,500	40,500
26	Aguasabon	Aguasabon	HEPCO	1948	1948	290	2	27,500	55,000	20,250	40,500
27	Red Rock Falls	Mississagi	HEPCO	1960	1961	93	2	26,500	53,000	20,250	40,500
28	Island Falls	Abitibi	APPC	1924	1925	65	4	12,000	48,000	9,600	38,400
29	DeCew Falls No. 1	Welland Canal	HEPCO	1901	1913	-	1	3,000		2,500	
							2	3,000		2,000	
							1	6,000		4,800	
							1	6,000		5,000	
							2	6,000		5,300	
							1	6,000		5,600	
							1	6,000	45,000	5,900	38,400

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
30	Kakabeka Falls	Kaministikwia	HEPCO	1906	1914	178	3	7,500		5,400	
							1	12,500	35,000	7,970	24,170
31	High Falls	Michipicoten	GLPC	1930	1950	147	2	11,000		6,750	
							1	13,200	35,200	9,675	23,175
32	Big Eddy	Spanish	HCL	1929	1929	90	3	9,400	28,200	7,200	21,600
33	Sault Ste. Marie	St. Mary	GLPC	1918	1931	18.5	24	900		650	
							3	2,400		1,440	
							1	2,200	31,000	1,600	21,520
34	Iroquois Falls	Abitibi Lake & Black River	APPC	1949	1949	43	1	1,800		1,200	
							1	1,800		1,280	
							1	2,200		1,200	
							6	2,200		1,280	
							5	2,500	31,500	2,025	21,485
35	Twin Falls	Abitibi	APPC	1921	1925	57.5	5	6,000	30,000	4,050	20,250
36	Gartshore Falls	Montreal	GLPC	1958	-	112	1	30,300	30,300	20,000	20,000
37	Hollingsworth Falls	Michipicoten	GLPC	1959	-	108	1	30,300	30,300	20,000	20,000
38	Ear Falls	English	PRO	1930	1948	36	1	5,000		4,000	
	(Operated by HEPCO for the Province of Ontario)						1	5,000		3,825	
							2	7,500	25,000	5,400	18,625
39	Norman	Winnipeg (West Branch)	OMPP	1925	1925	20	3	3,400		3,300	
							2	3,400	17,000	3,712	17,324
40	Lower Falls	Montreal	GLPC	1938	1941	185	2	10,900	21,800	8,100	16,200
41	Espanola	Spanish	KVPC	1906	1946	60	4	1,600		1,250	
						64	1	10,000		7,500	
						60	1	2,300		1,750	
						60	1	2,900	21,600	1,500	15,750
42	Hogg	Montreal	GLPC	1964	-	78	1	21,750	21,750	15,000	15,000
43	Scott Falls	Michipicoten	GLPC	1952	1952	70	2	10,000	20,000	6,800	13,600
44	High Falls	Spanish	HCL	1905	1918	85	4	3,550		2,000	
							1	7,500	21,700	5,550	13,550
45	Fort Frances	Rainy	OMPP	1955	1955	28	8	2,000	16,000	1,600	12,800
46	Thorold	Welland Canal	STLSA	1932	1932	-	3	5,000	15,000	4,000	12,000
47	Wawaitin Falls	Mattagami	HEPCO	1912	1918	125	2	3,450		2,500	
							2	4,000	14,900	3,375	11,750
48	Kenora	Winnipeg	OMPP	1923	1924	20	4	1,200		1,000	
							6	1,200	12,000	1,250	11,500
49	Heely Falls	Trent	HEPCO	1913	1919	73	2	5,600		3,750	
							1	5,600	16,800	3,000	10,500
50	McPhail Falls	Michipicoten	GLPC	1954	1954	48	2	7,500	15,000	5,000	10,000
51	Upper Notch	Montreal	HEPCO	1930	1930	48	2	6,500	13,000	4,800	9,600
52	Calm Lake	Seine	OMPP	1928	1928	82	2	6,500	13,000	4,675	9,350
53	Chaudière	Ottawa	EBEC	1909	1912	38	2	4,650		3,000	
							1	4,650	13,950	3,320	9,320
54	Crystal Falls	Sturgeon	HEPCO	1921	1921	33	4	2,600	10,400	2,020	8,080
55	Ranney Falls	Trent	HEPCO	1922	1926	-	1	1,000		720	
							2	5,000	11,000	3,600	7,920
56	Chaudière Falls No. 4	Ottawa	OHEC	1931	1931	38	2	5,400	10,800	3,960	7,920

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
57	Sturgeon Falls	Sturgeon	APPC	1902	1951	41	1	2,500		1,600	
						35	1	2,000		1,500	
						35	1	1,090		1,500	
						35	1	2,000		1,500	
						35	1	2,000	9,590	1,575	7,675
58	Big Eddy	Muskoka	HEPCO	1941	1941	38	2	5,280	10,560	3,825	7,650
59	Ragged Rapids	Muskoka	HEPCO	1938	1938	38	2	5,200	10,400	3,825	7,650
60	Sturgeon Falls	Seine	OMPP	1927	1927	62	2	5,000	10,000	3,825	7,650
61	Matabitchuan	Matabitchuan	HEPCO	1910	1924	305	4	3,300	13,200	1,690	6,760
62	Lower Sturgeon	Mattagami	HEPCO	1923	1923	42	2	4,000	8,000	3,200	6,400
63	Smooth Rock Falls	Mattagami	APPC	1916	1916	45	2	4,500	9,000	2,960	5,920
64	Peterborough	Otonabee	PHPC	1902	1950	27	1	2,300		1,500	
							1	2,550		1,875	
							1	2,140	6,990	1,750	5,125
65	Nairn	Spanish	HCL	1917	1917	30	2	2,000		1,500	
							1	2,600	6,600	1,875	4,875
66	Eugenia	Beaver	HEPCO	1915	1920	550	2	2,250		1,200	
							1	4,000	8,500	2,400	4,800
67	Meyersburg (Dam 8)	Trent	HEPCO	1924	1924	32	3	2,200	6,600	1,600	4,800
68	Chaudière Falls No. 2	Ottawa	OHEC	1909	1936	40	3	2,300	6,900	1,462	4,386
69	Coniston	Wanapitei	HEPCO	1905	1915	53	1	1,200		720	
							1	1,600		1,125	
							1	3,500	6,300	2,250	4,095
70	Stinson	Wanapitei	HEPCO	1925	1925	-	2	3,500	7,000	2,000	4,000
71	Calabogie	Madawaska	HEPCO	1917	1917	30	2	3,000	6,000	2,000	4,000
72	Big Chute	Severn	HEPCO	1911	1919	56	3	1,300		900	
							1	2,300	6,200	1,280	3,980
73	South Falls	South Muskoka	HEPCO	1916	1925	107	1	1,000		635	
							2	2,200	5,400	1,600	3,835
74	Wabageshik	Vermilion	HCL	1912	1935	70	1	2,700		1,500	
							1	2,700	5,400	2,130	3,630
75	Swift Rapids	Severn	OWLP	1917	1917	47	3	2,120	6,360	1,200	3,600
76	Minden	Gull	OWLP	1935	1935	70	2	2,600	5,200	1,800	3,600
77	Sandy Falls	Mattagami	HEPCO	1911	1916	32	2	1,200		950	
						34	1	2,500	4,900	1,595	3,495
78	Hagues Reach	Trent	HEPCO	1925	1925	22.5	3	1,600	4,800	1,120	3,360
79	Indian Chute	Montreal	HEPCO	1923	1924	45	2	2,250	4,500	1,620	3,240
80	Sidney	Trent	HEPCO	1911	1911	20	4	1,400	5,600	795	3,180
81	Seymour	Trent	HEPCO	1909	1911	23	4	1,100		600	
							1	1,100	5,500	750	3,150
82	Matthias	Muskoka	OWLP	1950	-	47	1	3,770	3,770	2,812	2,812
83	Hound Chute	Montreal	HEPCO	1910	1911	-	4	1,335	5,340	700	2,800
84	Spruce Falls	Kapuskasing	SFPPC	1923	-	30	1	2,500	2,500	2,750	2,750
85	Frankford	Trent	HEPCO	1913	1913	18	4	1,200	4,800	650	2,600

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
86	Jones Falls	Rideau Canal	GELW	1948	1950	65	1	250		180	
						58	2	1,037		800	
						58	1	1,500	3,824	800	2,580
87	Nassau	Otonabee	CGEC	1902	1926	16	1	2,000		1,500	
							2	700	3,400	480	2,460
88	McVittie	Wanapitei	HEPCO	1912	1912	42	2	1,800	3,600	1,125	2,250
89	High Falls	Mississippi	HEPCO	1920	1920	82	3	1,240	3,720	700	2,100
90	Nipissing	South	HEPCO	1909	1924	-	1	1,250		1,000	
							1	1,250	2,500	1,050	2,050
91	Lakefield	Otonabee	HEPCO	1928	-	16	1	3,100	3,100	2,000	2,000
92	Fountain Falls	Montreal	HEPCO	1914	1914	30	2	1,500	3,000	1,000	2,000
93	Rideau Falls	Rideau	NRC	1909	1909	47	2	1,500	3,000	1,000	2,000
94	Sills Island	Trent	HEPCO	1926	1926	14	1	1,000		960	
							1	1,000	2,000	1,020	1,980
95	Crow Bay	Trent Canal	CPUC	1909	1911	-	1	1,470		990	
							1	1,900	3,370	900	1,890
96	Auburn	Otonabee	HEPCO	1911	1912	18	3	950	2,850	625	1,875
97	Current River	Current	PAPUC	1902	1906	80	2	450		350	
							1	1,200	2,100	1,100	1,800
98	Eagle	Eagle	DPC	1928	-	37	1	2,000	2,000	1,760	1,760
99	Trethewey Falls	South Muskoka	HEPCO	1929	-	35	1	2,300	2,300	1,600	1,600
Total capacity of plants under 1,500 kw.									32,171		21,839
Total capacity of turbines connected directly to mechanical equipment									27,375		
Total (all plants)									8,218,320		5,936,871

Quebec

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Beauharnois:	St. Lawrence	QHEC								
	Section 1			1932	1948	80	8	53,000		37,300	
							6	55,000		40,000	
	Section 2			1950	1953	80	9	55,000		40,000	
							3	56,000		41,120	
	Section 3			1959	1961	80	10	73,700	2,154,000	55,250	1,574,260
2	Bersimis I	Bersimis	QHEC	1956	1958	785	8	150,000	1,200,000	114,000	912,000
3	Chute des Passes	Peribonka	ALCAN	1959	1960	540	5	200,000	1,000,000	148,500	742,500
4	Shipshaw	Saguenay	ALCAN	1942	1943	208	2	95,000		58,500	
							6	103,000		60,000	
							2	101,000		60,000	
							2	95,000	1,200,000	60,000	717,000
5	Bersimis II	Bersimis	QHEC	1959	1960	380	5	171,000	855,000	131,000	655,000
6	Carillon	Ottawa	QHEC	1962	1964	61	14	60,000	840,000	46,750	654,500
7	Isle Maligne	Saguenay	SAPCL	1925	1937	110	12	45,000	540,000	28,000	336,000
8	Trenche	St. Maurice	QHEC	1950	1955	160	6	65,000	390,000	47,700	286,200
9	Beaumont	St. Maurice	QHEC	1958	1959	124	6	55,000	330,000	40,500	243,000

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
QUEBEC (Cont'd)											
10	La Tuque	St. Maurice	QHEC	1940	1955	114	5	44,500		36,000	
							1	49,000	271,500	36,000	216,000
11	Paugan	Gatineau	QHEC	1928	1956	133	1	47,000		32,400	
						132	7	34,000	285,000	24,225	201,975
12	McCormick	Manicouagan	MP	1951	1958	124	2	56,200		35,625	
							3	60,000	292,400	40,000	191,250
13	Chute-à-la-Savanne	Peribonka	ALCAN	1953	1953	110	5	57,000	285,000	37,450	187,250
14	Chute-du-Diable	Peribonka	ALCAN	1952	1952	110	5	55,000	275,000	37,450	187,250
15	Rapide Blanc	St. Maurice	QHEC	1934	1955	108	1	44,500		30,600	
							5	40,000	244,500	30,600	183,600
16	Shawinigan No. 2	St. Maurice	QHEC	1911	1929	146	3	43,000		30,000	
						145	3	18,500		15,000	
						145	2	18,500	221,500	14,000	163,000
17	Cedars	St. Lawrence	QHEC	1914	1924	30	12	10,800		9,000	
							6	11,300	197,400	9,000	162,000
18	Shawinigan No. 3	St. Maurice	QHEC	1948	1949	145	3	65,000	195,000	50,000	150,000
19	Grand' Mère	St. Maurice	QHEC	1915	1930	80	5	22,000		15,700	
						80	1	22,000		18,000	
						80	1	24,500		20,000	
						84	2	22,000	200,500	15,700	147,900
20	Chelsea	Gatineau	QHEC	1927	1939	93	5	34,000	170,000	28,800	144,000
21	Chute à Caron	Saguenay	ALCAN	1931	1934	160	3	75,000		45,000	
							1	75,000	300,000	None	135,000
22	La Gabelle	St. Maurice	QHEC	1924	1931	63	3	36,000		24,700	
						63	1	32,000		24,700	
						60	1	32,000	172,000	24,700	123,500
23	Farmers Rapids	Gatineau	QHEC	1927	1947	66	3	24,000		20,000	
							2	24,000	120,000	19,125	98,250
24	Masson	Lièvre	MQPC	1933	1933	185	4	34,000	136,000	23,800	95,200
25	Quinze Rapids	Ottawa (Upper)	QHEC	1923	1955	90	2	12,500		8,000	
							2	12,500		10,800	
							2	34,500	119,000	26,000	89,600
26	Chats Falls	Ottawa	OVPC	1932	1932	53	4	28,000	112,000	22,325	89,300
27	High Falls	Lièvre	MQPC	1930	1936	180	1	32,500		21,250	
							3	30,000	122,500	21,250	85,000
28	Bryson	Ottawa	QHEC	1925	1949	60	2	25,700		18,000	
							1	27,000	78,400	20,000	56,000
29	Murdock Willson	Shipshaw	PBC	1957	-	263	1	82,000	82,000	51,000	51,000
30	Jim Gray	Shipshaw	PBC	1953	1953	338	2	35,000	70,000	25,500	51,000
31	Outardes 2	Outardes	QNSPC	1937	1937	208	2	35,300	70,600	25,000	50,000
32	Fifty Foot Falls	Hart Jaune	HJP	1960	1960	123	3	22,000	66,000	16,150	48,450
33	Rapid VII	Ottawa (Upper)	QHEC	1941	1949	68	4	16,000	64,000	12,000	48,000
34	Rapid II	Ottawa (Upper)	QHEC	1954	1964	67	4	16,000	64,000	12,000	48,000
35	Montreal	Prairies	QHEC	1929	1930	25	6	10,000	60,000	7,500	45,000
36	Dufferin Falls	Lièvre	JMC	1958	1959	62	2	25,000	50,000	19,125	38,250
37	Chicoutimi	Chicoutimi	SMPC	1957	-	273	1	42,000	42,000	32,000	32,000

No.	Development	River	Owner	Year Installed: First Unit	Year Installed: Latest Unit	Rated Head ft.	No. of Units	Turbines: Unit Capacity hp.	Turbines: Total Capacity hp.	Generators: Unit Capacity kw.	Generators: Total Capacity kw.
QUEBEC (Cont'd)											
38	Hemming Falls	St. François	QHEC	1925	1925	50	6	5,600	33,600	4,800	28,800
39	Ste. Marguerite	Marguerite	GPC	1954	1954	100	2	12,000	24,000	8,800	17,600
40	Kipawa	Gordon Creek	QHEC	1920	1926	200	2	3,600		2,800	
							2	8,500	24,200	5,760	17,120
41	Chaudière No. 2	Ottawa	QHEC	1920	1923	32	2	7,500		5,400	
							1	7,500	22,500	5,760	16,560
42	Seven Falls	St. Anne (de Beaupré)	QHEC	1915	1915	410	4	6,000	24,000	3,750	15,000
43	St. Narcisse	Batiscan	QHEC	1926	1926	147	2	11,100	22,200	7,500	15,000
44	Drummondville	St. François	QHEC	1910	1925	30	2	3,200		2,500	
							2	6,000	18,400	4,800	14,600
45	Chutes aux Galets	Shipshaw	PBC	1921	1921	101	2	8,820	17,640	6,400	12,800
46	Chaudière Falls	Ottawa	EBEC	1913	1955	38	3	5,500	16,500	3,750	11,250
47	Chicoutimi	Chicoutimi	PBC	1923	-	72	1	11,000	11,000	9,900	9,900
48	Waltham	Black	PELC	1917	1951	129	1	1,800		1,250	
							1	2,250		1,530	
							1	2,500		1,800	
							2	3,000	12,550	2,250	9,080
49	Chaudière No. 1	Ottawa	QHEC	1902	1912	38	3	2,500		1,275	
							1	3,300		1,700	
							1	3,300	14,100	2,125	7,650
50	Buckingham	Lièvre	ERC	1914	1939	30	1	2,000		1,375	
							1	2,500		1,840	
							3	2,000	10,500	1,440	7,535
51	Price	Mitis	QHEC	1922	1929	128	1	3,700		2,400	
						120	1	5,900	9,600	4,000	6,400
52	Adam Cunningham	Shipshaw	PBC	1953	-	56	1	9,500	9,500	6,375	6,375
53	Arnault Bridge	Chicoutimi	QDNR	1923	1923	56	3	2,500	7,500	1,690	5,070
54	Bell Falls	Rouge	QHEC	1915	1920	54	3	2,400	7,200	1,600	4,800
55	Westbury	St. François	CS	1928	1928	28	2	2,900	5,800	2,250	4,500
56	Jonquière	Au Sable	MJ	1907	1924	42	1	700		360	
						42	1	1,800		1,280	
						47	1	4,030	6,530	2,812	4,452
57	Grand Métis No. 2	Mitis	QHEC	1947	-	75	1	6,000	6,000	4,250	4,250
58	Kenogami	Au Sable	PBC	1912	1912	264	2	3,350	6,700	1,875	3,750
59	Lachute	North	AL	1929	1929	36	3	1,500	4,500	1,200	3,600
60	Weedon	St. François	CS	1920	1926	30	2	1,700		1,100	
						29	1	1,700	5,100	1,100	3,300
61	Windsor Mills	St. François	CPC	1936	1939	19	2	1,100		1,120	
							1	730		600	
							1	730	3,660	320	3,160
62	St. Alban	Ste. Anne de la Pérade	QHEC	1927	-	64	1	4,000	4,000	3,000	3,000
63	Domtar	Jacques Cartier	DT	1960	1962	60	2	1,200	2,400	1,500	3,000
64	Sherbrooke	Magog	SCPC	1910	1910	57	3	1,333	4,000	995	2,985
65	St. Raphael	Sud	QHEC	1921	1921	232	3	1,500	4,500	850	2,550

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
QUEBEC (Cont'd)											
66	Garneau Falls	Chicoutimi	QHEC	1928	-	30	1	3,500	3,500	2,520	2,520
67	MacDougall Falls	Jacques Cartier	DP	1925	1927	50	2	1,900	3,800	1,200	2,400
68	Jonquière Mill	Au Sable	PBC	1916	1916	67	1 1	1,800 1,625	3,425	1,200 1,200	2,400
69	Ogilvy Flour Mills	Lachine Canal	OFM	1940	1948	23 15	2 2	1,600 400	4,000	850 300	2,300
70	Mont Laurier	Lièvre	EML	1937	1951	22	1 2	500 1,325	3,150	500 900	2,300
71	Winneway	Winneway (Upper Ottawa)	BQM	1938	1943	57	2	1,400	2,800	1,100	2,200
72	Rock Forest	Magog	CS	1911	1911	30	2	1,500	3,000	1,075	2,150
73	Chaudière	Chaudière	QHEC	1900	1903	114	2 1	1,400 2,000	4,800	600 800	2,000
74	Magpie	Magpie	OER	1961	1961	27	2	1,500	3,000	1,000	2,000
75	Magog	Magog	DTC	1920	1920	25	2	1,350	2,700	1,000	2,000
76	Corbeau	Gatineau	QHEC	1926	1926	12	2	1,250	2,500	1,000	2,000
77	Bird's Mill Falls	Jacques Cartier	DP	1937	-	27	1	2,250	2,250	1,920	1,920
78	Frontenac	Magog	CS	1917	1917	38	2	1,450	2,900	950	1,900
79	Rivière-du-Loup	Du Loup	CRL	1929	1942	100	1 1	960 1,800	2,760	640 1,200	1,840
80	Rawdon	Ouareau	QHEC	1927	-	50	1	2,300	2,300	1,720	1,720
81	Burroughs Falls	Nigger	QHEC	1929	-	175	1	2,000	2,000	1,600	1,600
82	Natural Steps	Montmorency	QHEC	1908	-	60	1	2,225	2,225	1,500	1,500
83	St. Gabriel	Jacques Cartier	QHEC	1899	1899	32	2	1,100	2,200	750	1,500
	Total capacity of plants under 1,500 kw.								46,530		30,829
	Total capacity of turbines connected directly to mechanical equipment								59,365		
	Total (all plants)								13,372,685		9,553,151

New Brunswick

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Beechwood	Saint John	NBEPC	1957	1962	57	2 1	45,000 55,000	145,000	36,000 40,500	112,500
2	Grand Falls	Saint John	NBEPC	1928	1931	125	4	20,000	80,000	15,750	63,000
3	Tobique	Tobique	NBEPC	1953	1953	75	2	13,500	27,000	10,000	20,000
4	Tinker	Aroostook	MNBP	1906	1952	85	2 2	2,000 5,000	14,000	1,500 3,520	10,040
5	Bathurst	Nepisiguit	BPPC	1921	1929	100 109	2 1	4,500 5,500	14,500	3,600 2,520	9,720

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
NEW BRUNSWICK (Cont'd)											
6	Musquash	Musquash	NBEPC	1920	1920	99.5	2	3,670		2,320	
						124.5	1	3,760	11,100	2,320	6,960
7	Milltown	St. Croix	NBEPC	1911	1962	21	3	1,080		770	
						25	1	500		376	
							1	468	4,208	350	3,036
8	Edmundston	Madawaska	FC	1918	1918	21.1	2	1,030	2,060	1,000	2,000
	Total capacity of plants under 1,500 kw.								2,000		1,400
	Total capacity of turbines connected directly to mechanical equipment								5,700		
	Total (all plants)								305,568		228,656

Nova Scotia

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Deep Brook	Mersey	NSPC	1950	1950	46	2	6,400	12,800	4,500	9,000
2	Big Falls	Mersey	NSPC	1929	1929	58	2	6,350	12,700	4,500	9,000
3	Weymouth Falls	Sissiboo	NSPC	1960	-	122	1	12,000	12,000	9,000	9,000
4	Lower Lake Falls	Mersey	NSPC	1929	1929	48.5	2	5,300	10,600	3,690	7,380
5	Cowie Falls	Mersey	NSPC	1937	1937	43	2	5,100	10,200	3,600	7,200
6	Ruth Falls	East, Sheet Harbour	NSPC	1927	1936	110	2	3,290		2,000	
						109	1	4,300	10,880	2,970	6,970
7	Hell's Gate	Black	NSLPC	1930	1949	185	1	4,500		3,360	
							1	4,500	9,000	3,570	6,930
8	Nictaux	Nictaux	NSLPC	1954	-	382	1	9,000	9,000	6,800	6,800
9	Gulch	Bear	NSPC	1956	-	225	1	8,500	8,500	6,000	6,000
10	Sissiboo Falls	Sissiboo	NSPC	1960	-	87	1	8,000	8,000	6,000	6,000
11	Upper Lake Falls	Mersey	NSPC	1929	1929	31.5	2	3,000	6,000	2,700	5,400
12	Hollow Bridge	Black	NSLPC	1940	-	148	1	7,500	7,500	5,312	5,312
13	Tidewater	North East	NSPC	1921	1921	91.5	2	3,450	6,900	2,320	4,640
14	Lower Great Brook	Mersey	NSPC	1955	1955	22	2	3,120	6,240	2,250	4,500
15	Ridge	Bear	NSPC	1957	-	140	1	5,300	5,300	4,000	4,000
16	Dickie Brook	Dickie Brook	NSPC	1948	1948	298	1	1,750		1,200	
							1	1,750	3,500	2,600	3,800
17	Avon No. 1	Avon	NSLPC	1958	-	117.5	1	5,000	5,000	3,750	3,750
18	Malay Falls	East, Sheet Harbour	NSPC	1924	1954	43	2	1,850		1,200	
						41	1	1,740	5,440	1,200	3,600
19	Paradise	Paradise Brook	NSLPC	1950	-	465	1	5,000	5,000	3,600	3,600
20	Methal's	Methal's Brook	NSLPC	1949	-	45	1	4,600	4,600	3,400	3,400
21	Sandy Lake	North East	NSPC	1927	1927	118	2	2,500	5,000	1,600	3,200
22	White Rock	Gasperaux	NSLPC	1952	-	58	1	4,000	4,000	3,200	3,200
23	St. Croix	St. Croix	MBPP	1934	-	148	1	4,200	4,200	3,000	3,000
24	Avon No. 2	Avon	NSLPC	1929	-	142	1	3,900	3,900	3,000	3,000
25	Lumsden	Black	NSLPC	1942	-	72	1	4,500	4,500	2,800	2,800

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
NOVA SCOTIA (Cont'd)											
26	Mill Lake	North East	NSPC	1921	1921	162.5	2	1,900	3,800	1,280	2,560
27	Tusket	Tusket	NSPC	1929	1929	18	3	940	2,820	720	2,160
28	Salmon Hole	St. Croix	MBPP	1938	-	75	1	2,500	2,500	2,000	2,000
	Total capacity of plants under 1,500 kw.								6,785		4,728
	Total capacity of turbines connected directly to mechanical equipment								-		
	Total (all plants)								196,665		142,930

Newfoundland

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbine Unit Capacity hp.	Turbine Total Capacity hp.	Generator Unit Capacity kw.	Generator Total Capacity kw.
1	Twin Falls	Unknown	TFPC	1962	1962	290	4	60,000	240,000	46,800	187,200
2	Deer Lake	Humber	BPC	1925	1930	247	7 2	14,000 29,000	156,000	9,750 20,000	108,250
3	Grand Falls	Exploits	ANDC	1909	1938	109	3 1	2,500 36,000	43,500	1,500 22,000	26,500
4	Menihek	Ashuanipi (Labrador)	IOCC	1954	1960	34 40	2 1	6,000 13,500	25,500	4,250 10,200	18,700
5	Bishops Falls	Exploits	ANDC	1909	1952	35	7 2	2,700 1,700	22,300	2,000 1,500	17,000
6	Rattling Brook	Rattling Brook	NLPC	1958	1958	307	2	8,500	17,000	6,750	13,500
7	Mobile	Mobile	NLPC	1951	-	370	1	13,000	13,000	9,350	9,350
8	Corner Brook	Corner Brook	BPC	1958	1958	559	2	6,000	12,000	4,600	9,200
9	Horse Chops	Horse Chops	NLPC	1953	-	276	1	10,000	10,000	7,650	7,650
10	Tors Cove	Tors Cove	NLPC	1942	1951	173	2 1	2,850 3,550	9,250	2,000 2,500	6,500
11	Cape Broyle	Horse Chops	NLPC	1952	-	176	1	7,600	7,600	6,000	6,000
12	Sandy Brook	Sandy Brook	NLPC	1963	-	115	1	8,000	8,000	5,950	5,950
13	Lookout Brook	Lookout Brook	WCPC	1945	1958	575	2 1	1,850 3,600	7,300	1,400 2,400	5,200
14	Petty Harbour	Petty Harbour	NLPC	1908	1926	190	2 1	2,100 2,750	6,950	1,600 1,800	5,000
15	New Chelsea	New Chelsea Brook	UTEC	1957	-	275	1	5,600	5,600	4,000	4,000
16	Seal Cove	Seal Cove	UTEC	1922	1927	190	1 1	1,500 3,040	4,540	1,200 2,400	3,600
17	Pierres Brook	Pierres Brook	NLPC	1931	-	263	1	4,500	4,500	3,200	3,200
18	Rocky Pond	Tors Cove	NLPC	1943	-	107	1	4,200	4,200	3,200	3,200
19	Lockston	Lockston	UELPC	1956	1961	270	2	2,000	4,000	1,480	2,960
20	Hearts Content	Hearts Content Brook	UTEC	1960	-	150	1	3,600	3,600	2,400	2,400
21	Buchans Brook	Buchans Brook	ASRC	1927	-	163	1	2,359	2,359	1,760	1,760
	Total capacity of plants under 1,500 kw.								9,175		6,340
	Total capacity of turbines connected directly to mechanical equipment								22,000		
	Total (all plants)								638,374		453,460

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.

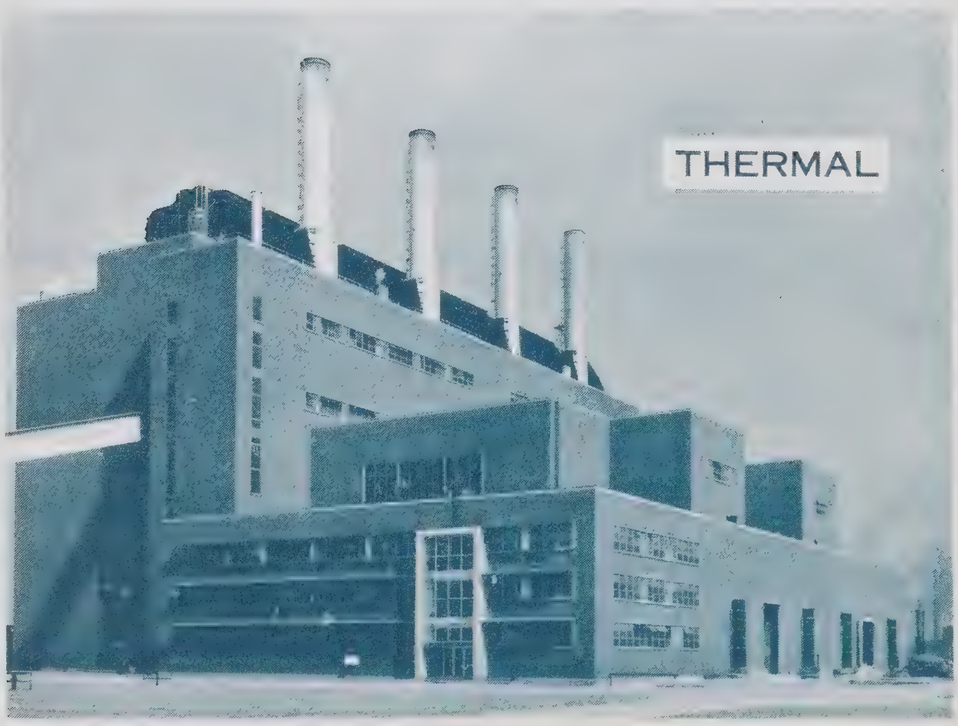
Yukon Territory

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Whitehorse Rapids	Yukon	NCPC	1958	1958	61	2	7,500	15,000	5,695	11,390
2	North Fork	Klondike	YCGC	1911	1935	220	1	5,000		3,600	
							1	5,000		2,700	
							1	5,000	15,000	3,750	10,050
3	Mayo River	Mayo	NCPC	1952	1957	110	2	3,000	6,000	2,550	5,100
	Total capacity of plants under 1,500 kw.								2,140		1,650
	Total capacity of turbines connected directly to mechanical equipment								-		-
	Total (all plants)								38,140		28,190

Northwest Territories

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Snare Falls	Snare	NCPC	1960	-	63	1	9,200	9,200	7,000	7,000
2	Snare Rapids	Snare	NCPC	1948	-	56	1	8,350	8,350	7,000	7,000
3	Bluefish Lake	Yellowknife	CMSC	1941	-	110	1	4,700	4,700	3,360	3,360
	Total capacity of plants under 1,500 kw.								-		-
	Total capacity of turbines connected directly to mechanical equipment								-		-
	Total (all plants)								22,250		17,360

Canada (TOTAL HYDRO CAPACITY) 20,331,231


THERMAL

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
British Columbia										
1	Burrard	Vancouver	BCHPA	1962	1963	Gas, oil	S	2	150,000	300,000
2	Port Mann	New Westminster	BCHPA	1959	1959	Oil	GT	4	27,000	108,000
3	Georgia	Chemainus	BCHPA	1958	1959	Oil	GT	4	21,760	87,040
4	Harmac	Nanaimo	MBPR	1954	1963	Oil, wood-waste	S	1 1 1	31,500 4,000 1,250	36,750
5	Prince George	Prince George	BCHPA	1957	1963	Gas, oil	GT IC	1 7 2	6,000 3,000 1,000	29,000
6	Somass Mill	Port Alberni	MBPR	1963	-	Wood-waste	S	1	26,000	26,000
7	Dawson Creek	Dawson Creek	BCHPA	1953	1963	Gas, oil	IC	2 6	1,000 3,000	20,000
8	Powell River	Powell River	MBPR	1948	1960	Wood-waste, oil	S	1 1 1 1	1,500 1,200 12,500 3,000	18,200
9	Port Alice	Port Alice	RC	1942	1957	Oil, wood-waste	S	1 2 1	3,200 3,500 6,000	16,200
10	Watson Island	Watson Island	CCC	1950	1950	Oil, wood-waste	S	2	7,500	15,000
11	Ocean Falls	Ocean Falls	CZC	1930	1950	Oil, wood-waste	S	1 1 1 1	3,000 2,500 4,000 5,000	14,500
12	New Westminster	New Westminster	CZB	1912	1950	Wood-waste	S	1 1 1	5,000 1,500 6,000	12,500
13	Eburne Sawmills	Vancouver	CFP	1960	1960	Wood-waste	S	2	5,000	10,000
14	Quesnel	Quesnel	BCHPA	1957	1961	Gas, oil	IC	3	3,000	9,000
15	Chetwynd	Chetwynd	BCHPA	1958	1963	Gas, oil	IC	2 2 2	3,000 900 600	9,000
16	Dry Dock	Prince Rupert	BCHPA	1950	1963	Oil	IC	3 1 1 2	710 2,000 2,034 1,000	8,164
17	Kitimat	Kitimat	ALCAN	1954	1959	Oil	IC	8	1,000	8,000
18	Taylor	Taylor	PP	1957	1957	Gas	S	3	2,500	7,500
19	Kelowna	Kelowna	SMS	1950	1963	Wood-waste, oil, coal	S	1 1 1 1	750 2,000 3,500 1,000	7,250
20	Woodfibre	Woodfibre	RC	1948	1961	Oil, wood-waste	S	2 1	2,000 3,000	7,000
21	Port Mellon	Port Mellon	CFP	1928	1947	Oil	S	1 1 1	500 1,500 3,000	5,000

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
BRITISH COLUMBIA (Cont'd)										
22	Vancouver	Vancouver	MBPR	1949	1956	Wood-waste	S	1 1	750 4,000	4,750
23	Kimberley (Stand-by)	Kimberley	CMSC	1927	1928	Coal	S	3	1,500	4,500
24	Kamloops	Kamloops	BCHPA	1953	1953	Gas, oil	IC	2 1	1,000 2,500	4,500
25	Victoria	Victoria	BCFP	1940	1950	Wood-waste, oil	S	1 1	3,000 1,500	4,500
26	Youbou	Youbou	BCFP	1929	1958	Wood-waste	S	1 2 1	800 750 2,000	4,300
27	Terrace	Terrace	BCHPA	1952	1958	Oil	IC	2 3	600 1,000	4,200
28	Hammond	Hammond	BCFP	1928	1929	Wood-waste	S	2	2,000	4,000
29	Smithers	Smithers	BCHPA	1951	1959	Oil	IC	2 1 2	560 760 1,000	3,880
30	Chemainus	Chemainus	MBPR	1925	1950	Wood-waste, oil	S	1 1	3,000 750	3,750
31	Vancouver	Vancouver	BCSRC	1947	1960	Gas, oil	S	3	1,250	3,750
32	Burns Lake	Burns Lake	BCHPA	1954	1960	Oil	IC	1 4 1	800 250 1,136	2,936
33	Mesachie Lake	Mesachie Lake	HLC	1943	1949	Wood-waste	S	1 1 1	1,600 750 260	2,610
34	Fort Nelson	Fort Nelson	BCHPA	1960	1960	Oil, gas	IC	1 1 1 1 1	1,200 600 300 150 100	2,350
35	Revelstoke	Revelstoke	COR	1926	1954	Oil	IC	2 1 1	300 400 1,000	2,000
36	Wells	Wells	CGQM	1936	1955	Oil	IC	1 2 1 2 2	350 300 125 250 150	1,875
37	Giscome	Giscome	ELS	1951	1956	Wood-waste, oil	S IC	1 1	1,500 300	1,800
38	Port Hardy	Port Hardy	BCHPA	1959	1963	Oil	IC	1 1 2	600 500 300	1,700
39	Vanderhoof	Vanderhoof	BCHPA	1953	1955	Oil	IC	1 1	600 1,000	1,600
Total capacity of plants 1,500 kw. and over (not listed above)										7,500
Total capacity of plants under 1,500 kw.										24,734
Total (all plants)										845,339

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.

Alberta

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Edmonton	Edmonton	CE	1939	1963	Gas, oil	S	2	15,000	
								3	30,000	
								2	75,000	
							GT	2	30,000	330,000
2	Wabamun	Wabamun	CP	1956	1962	Gas, coal	S	2	66,000	
								1	150,000	282,000
3	Battle River	Forestburg	CU	1956	1964	Coal, oil	S	2	32,000	64,000
4	Vermilion	Vermilion	CU	1948	1961	Gas	S	4	2,250	
							GT	1	30,000	39,000
5	Medicine Hat	Medicine Hat	CMH	1929	1953	Gas	S	1	3,000	
								1	5,000	
								1	30,000	38,000
6	Lethbridge	Lethbridge	CL	1931	1961	Gas	S	1	3,375	
								2	5,000	
							GT	2	10,000	33,375
7	Hinton	Hinton	NWPP	1956	1957	Gas, wood-waste, oil	S	1	20,000	
							IC	1	1,100	
								1	1,000	22,100
8	Sturgeon	Valleyview	CU	1958	1961	Flare gas	GT	1	10,000	
								1	8,500	18,500
9	Clover Bar	Edmonton	CCCL	1953	1953	Gas	S	3	6,000	18,000
10	Drumheller	Drumheller	CU	1948	1951	Coal	S	2	7,500	15,000
11	Duvernay	Duvernay	WC	1953	1958	Gas	S	3	300	
								1	1,200	
							IC	6	500	
							GT	1	8,437	13,537
12	Fairview	Fairview	CU	1954	1960	Gas	IC	1	1,200	
			NU					3	3,000	
			NU					1	1,200	11,400
13	Sentinel	Coleman	EKPC	1927	1929	Coal	S	2	5,000	10,000
14	Fort Saskatchewan	Fort Saskatchewan	SGM	1954	1959	Gas	S	2	2,500	5,000
15	Rimbey	Rimbey	BA	1960	1963	Gas	S	4	1,000	4,000
16	Grande Prairie	Grande Prairie	CU	1948	1955	Gas, oil	IC	1	800	
								1	600	
								1	2,500	3,900
17	Taber	Taber	CSF	1950	1960	Gas, oil	S	1	2,000	
								1	1,675	3,675
18	Whitecourt	Whitecourt	PAPC	1958	1962	Gas	IC	2	300	
								3	800	3,000
19	Jasper	Jasper	NU	1941	1964	Oil	IC	1	1,200	
								1	474	
								1	96	
								1	500	
								1	300	2,570
20	Edmonton	Edmonton	DPW	1960	-	Gas	GT	1	2,200	2,200
21	Picture Butte	Picture Butte	CSF		1964	Gas	S	1	1,250	
								1	750	2,000

No.	Station	Location	Owner	Year Installed First Unit	Year Installed Latest Unit	Fuel	Type of Prime Mover	Generators No.	Generators Unit Capacity kw.	Generators Total Capacity kw.
ALBERTA (Cont'd)										
22	Athabasca	Athabasca	NU	1953	1961	Gas	IC	1	1,200	
								2	300	1,800
23	Worsley	Worsley	NU	1963	1963		S	1	864	
								1	650	1,514
Total capacity of plants 1,500 kw. and over (not listed above)										4,000
Total capacity of plants under 1,500 kw.										7,246
Total (all plants)										935,817

Saskatchewan

1	Boundary Dam	Estevan	SPC	1959	1960	Coal	S	2	66,000	132,000
2	Queen Elizabeth	Saskatoon	SPC	1958	1959	Gas, oil, coal	S	2	66,000	132,000
3	A.L. Cole	Saskatoon	SPC	1929	1957	Goal, oil, gas	S	1	10,000	
								1	15,000	
								2	25,000	
								1	30,000	105,000
4	Regina	Regina	CR	1925	1960	Oil, gas	S	1	15,000	
								1	5,000	
								1	20,000	
								1	30,000	
							GT	1	23,360	93,360
5	Estevan	Estevan	SPC	1929	1957	Coal, gas	S	1	1,500	
								1	1,250	
								1	5,000	
								1	15,000	
								1	20,000	
								1	30,000	72,750
6	Kindersley	Kindersley	SPC	1955	1958	Gas	IC	3	3,000	
							GT	2	10,000	29,000
7	Swift Current	Swift Current	SPC	1954	1957	Oil	IC	2	1,275	
								4	3,000	14,550
8	Eldorado	Eldorado	EMR	1952	1956	Resid-ual oil	IC	3	392	
								1	382	
								4	2,250	10,558
9	Flin Flon	Flin Flon (Saskatchewan)	HBMS	1929	1951	Coal, oil	S	1	1,000	
								1	6,000	7,000
Total capacity of plants 1,500 kw. and over (not listed above)										10,000
Total capacity of plants under 1,500 kw.										4,207
Total (all plants)										610,425

Manitoba

1	Brandon	Brandon	MH	1957	1958	Coal, gas, oil	S	4	33,000	132,000
2	Selkirk	Selkirk	MH	1960	1960	Coal, oil	S	2	66,000	132,000

No.	Station	Location	Owner	Year Installed: First Unit	Year Installed: Latest Unit	Fuel	Type of Prime Mover	Generators: No.	Generators: Unit Capacity kw.	Generators: Total Capacity kw.
MANITOBA (Cont'd)										
3	Amy Street	Winnipeg	CW	1924	1954	Coal	S	2	5,000	
								1	15,000	
								1	25,000	50,000
4	The Pas	The Pas	MH	1948	1962	Oil	IC	1	1,100	
								2	1,000	
								1	750	
								1	400	4,250
5	Churchill	Churchill	NHB	1931	1955	Grain refuse,	S	2	1,500	
								1	600	
						oil, coal	IC	1	200	
								1	250	4,050
6	Fort Garry	Winnipeg	MSC	1940	1953	Oil	S	1	1,500	
								1	2,500	4,000
7	Lynn Lake	Lynn Lake	SGM	1955	1961	Oil	IC	1	175	
								1	1,000	
								1	2,160	3,335
8	Thompson	Thompson	INCO		1958	Oil	IC	2	1,500	3,000
9	Grand Rapids	Grand Rapids	MH	1961	1963	Oil	IC	2	1,000	2,000
Total capacity of plants 1,500 kw. and over (not listed above)										9,236
Total capacity of plants under 1,500 kw.										2,217
Total (all plants)										346,088
Ontario										
1	Richard L. Hearn	Toronto	HEPCO	1951	1961	Coal	S	4	100,000	
								4	200,000	1,200,000
2	Lakeview	Toronto	HEPCO	1961	1964	Coal	S	3	300,000	900,000
3	J. Clark Keith	Windsor	HEPCO	1951	1953	Coal	S	4	66,000	264,000
4	Thunder Bay	Fort William	HEPCO	1963	-	Coal	S	1	100,000	100,000
5	Windsor	Windsor	FMCC	1936	1952	Coal	S	1	10,000	
								1	4,000	
								2	25,000	64,000
6	Sarnia	Sarnia	PC	1943	1956	Coal, oil	S	1	10,000	
								1	5,000	
								1	4,000	
								1	13,280	32,280
7	Fort William	Fort William	GLPC	1928		Gas, coal, wood-waste	S	1	4,000	
								1	5,000	
								1	17,100	26,100
8	Sault Ste. Marie	Sault Ste. Marie	ASC	1963	1963	Gas, oil coal	S	2	12,500	25,000
9	Kapuskasing	Kapuskasing	SFPPC	1928	1958	Coal, gas, wood-waste	S	2	650	
								1	12,500	
								1	9,100	22,900
10	Nuclear Power Demonstration Unit	Rolphton	AECL	1962	-	uranium dioxide	S	1	20,000	20,000
11	Marathon	Marathon	MCC	1946	1948	Coal, oil	S	1	7,500	
								2	4,000	15,500

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)										
12	Hamilton	Hamilton	SCC	1948	1959	Coke-oven gas, oil	S	1 1	4,000 6,000	10,000
13	Amherstburg	Amherstburg	BRMC	1918	1957	Coal	S	1 2 1 1	2,500 600 2,000 3,750	9,450
14	Thorold	Thorold	OPC	1937	1937	Coal, gas	S	2	4,000	8,000
15	Dryden	Dryden	DPC	1954	-	Coal, gas	S	1	6,000	6,000
16	Walkerville	Walkerville	HWS	1924	1955	Coal	S	2 1 1	1,000 2,500 625	5,125
17	Sault Ste. Marie	Sault Ste. Marie	APPC	1927	-	Coal, gas, wood-waste	S	1	3,500	3,500
18	Strathcona	Strathcona	SP	1955	1955	Coal	S	2	1,655	3,310
19	Wallaceburg	Wallaceburg	CDSC	1950	1953	Coal, oil	S	2	1,500	3,000
20	Chatham	Chatham	CDSC	1946	1946	Coal	S	2	1,500	3,000
21	Fort Frances	Fort Frances	OMPP	1927	-	Coal	S	1	3,000	3,000
22	Blind River	Blind River	MFLC	1927	1927	Wood-waste	S	1 1	750 2,000	2,750
23	Station No. 6	Gananoque	GELW	1959	1959	Gas	IC	2	1,360	2,720
24	Toronto	Toronto	CDSC	1959	-	Coal, gas, oil	S	1	2,500	2,500
25	Toronto	Toronto	CCCC	1937	-	Coal, oil	S	1	2,500	2,500
26	Ottawa	Ottawa	EBEC	1923	-	Coal	S	1	2,500	2,500
27	Port Arthur	Port Arthur	APPC	1928	-	Coal, wood-waste, gas	S	1	2,500	2,500
28	New Toronto	New Toronto	GTR	1940	-	Coal, oil	S	1	2,500	2,500
29	Pembroke	Pembroke	PELC	1929	1949	Oil	IC	1 2	865 670	2,205
30	Orillia	Orillia	OWLP	1947	1948	Oil	IC	1 1	1,000 1,136	2,136
31	Peterborough	Peterborough	CGEC	1930	1949	Coal	S	1	2,000	2,000
32	Espanola	Espanola	KVPC	1947	1951	Coal	S	1	2,000	2,000
Total capacity of plants 1,500 kw. and over (not listed above)										98,050
Total capacity of plants under 1,500 kw.										16,070
Total (all plants)										2,864,596

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.

Québec

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Tracy	Tracy	QHEC	1964	-	Oil	S	1	150,000	150,000
2	Les Boules	Les Boules	QHEC	1955	1960	Oil	GT	6	6,000	
							IC	2	1,000	38,000
3	Chandler	Chandler	GPP	1930	1954	Oil	S	1	6,000	
								1	2,500	
								1	4,000	12,500
4	Noranda	Noranda	NM	1934	1957	Waste heat	S	1	2,600	
								1	3,000	
								1	4,500	10,100
5	Drummondville	Drummondville	CCL	1935	1953	Coal, oil	S	1	1,500	
								1	2,500	
								1	3,500	
								1	2,000	9,500
6	Murdochville	Murdochville	GCM	1952	1955	Oil, waste heat	S	1	5,400	
							IC	2	1,000	
								1	300	7,700
7	Thurso	Thurso	TPPC	1957	-	Coal, oil, wood-waste	S	1	7,500	7,500
8	Quebec City	Quebec City	ACPP	1927	-	Oil	S	1	6,000	6,000
9	Rimouski	Rimouski	QHEC	1955	1960	Oil	IC	6	1,000	6,000
10	Cap aux Meules	Îles-de-la-Madeliene	QHEC	1953	1964	Oil	IC	2	250	
								1	400	
								1	1,065	
								1	1,000	
								1	1,100	4,065
11	Magog	Magog	DTC	1938	1948	Coal	S	2	2,000	4,000
12	Gatineau	Gatineau	CIPC	1927	1927	Coal	S	4	900	3,600
13	Montreal	Montreal	CDSC	1925	1947	Gas, oil	S	2	1,000	
								1	1,500	3,500
14	Port and Terminal (Stand-by)	Port Cartier	QCMC	1960	1960	Oil	IC	3	1,000	
								1	350	3,350
15	Lac Jeannine (Stand-by)	Gagnon	QCMC	1960	1960	Oil	IC	3	350	
								2	1,000	3,050
16	Schefferville	Schefferville	IOCC	1956	1956	Oil	IC	3	1,000	3,000
17	Gaspé	Gaspé	QHEC	1959	1960	Oil	IC	3	1,000	3,000
18	Three Rivers	Three Rivers	CIPC	1922	1925	Coal, oil, wood-waste	S	6	500	3,000
19	Murdochville	Murdochville	QHEC	1955	1960	Oil	IC	3	1,000	3,000
20	Manicouagan	Manicouagan	QHEC	1955	1955	Oil	IC	3	1,000	3,000
21	Beaupré	Beaupré	SAPC	1927	1927	Coal	S	2	750	
								2	650	2,800
22	Rimouski	Rimouski	QHEC	1948	1952	Oil	IC	1	1,250	
								1	1,100	2,350
23	New Richmond	New Richmond	CEB	1948	1955	Oil	IC	1	200	
								2	350	
								1	400	
								1	750	2,050

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
QUÉBEC (Cont'd)										
24	Rivière-du-Loup	Rivière-du-Loup	CRL	1947	1953	Oil	IC	2 1	240 1,360	1,840
Total capacity of plants 1,500 kw. and over (not listed above)										6,750
Total capacity of plants under 1,500 kw.										16,946
Total (all plants)										316,601

New Brunswick

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Grand Lake No. 2	Newcastle Creek	NBEPC	1951	1963	Coal	S	2 1 1	5,000 15,000 60,000	85,000
2	Courtenay Bay	East Saint John	NBEPC	1961	-	Oil	S	1	47,500	47,500
3	Chatham	Chatham	NBEPC	1948	1956	Coal, oil	S	1 1	12,500 20,000	32,500
4	Lancaster	Lancaster	IPP	1947	1960	Oil	S	1 1 1	2,000 10,000 12,500	24,500
5	Bathurst	Bathurst	BPPC	1937	1958	Coal, oil	S	1 1 1	6,000 6,612 7,000	19,612
6	Edmundston	Edmundston	FC	1949	1958	Coal, wood-waste	S	1 1 1	3,000 3,800 12,500	19,300
7	Grand Lake No. 1	Newcastle Creek	NBEPC	1931	1944	Coal	S	1 1 1	2,500 6,250 7,500	16,250
8	Dock Street	Saint John	NBEPC	1929	1947	Coal, oil	S	1 1	6,000 10,000	16,000
9	Dalhousie	Dalhousie	NBIPC	1929	1937	Coal	S	1 1	6,000 8,000	14,000
10	Atholville	Atholville	FC	1929	1956	Coal, wood-waste	S	4 1 1	1,000 2,000 5,000	11,000
11	Newcastle	Newcastle	FC	1949	1949	Coal	S	1 1	2,000 2,500	4,500
12	Edmundston	Edmundston	ME	1947	1955	Oil	IC	2 1	690 1,876	3,256
13	Campbellton	Campbellton	CC	1946	1953	Oil	IC	1 1 1	240 1,136 1,360	2,736
Total capacity of plants 1,500 kw. and over (not listed above)										
Total capacity of plants under 1,500 kw.										3,490
Total (all plants)										299,644

No.	Station	Location	Owner	Year Installed: First Unit	Year Installed: Latest Unit	Fuel	Type of Prime Mover	Generators: No.	Generators: Unit Capacity kw.	Generators: Total Capacity kw.

Nova Scotia

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Lower Water Street	Halifax	NSLPC	1944	1959	Coal, oil	S	1	12,500	
								2	20,000	
								1	25,000	
								2	45,000	167,500
2	Glace Bay	Glace Bay	SPCL	1932	1959	Coal	S	2	6,000	
								4	15,000	72,000
3	Trenton	Trenton	NSPC	1951	1959	Coal	S	2	10,000	
								2	20,000	60,000
4	Sydney	Sydney	DOSCO	1919	1943	Coal, oil, gas	S	1	7,600	
								2	3,000	
								1	5,000	
								1	16,000	34,600
5	Harrison Lake	Maccan	NSPC	1926	1949	Coal	S	1	15,000	
								1	6,250	
								1	1,500	
								1	4,000	26,750
6	Port Hawkesbury	Point Tupper	NSP	1962	-	Coal	S	1	11,500	11,500
7	Brooklyn	Brooklyn	BMPC	1943	-	Oil, wood-waste	S	1	5,170	5,170
8	King Street	Yarmouth	WNSE	1937	1948	Oil	IC	1	320	
								1	400	
								2	1,920	
	Total capacity of plants 1,500 kw. and over (not listed above)									5,200
	Total capacity of plants under 1,500 kw.									3,928
	Total (all plants)									388,568

Prince Edward Island

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Charlottetown	Charlottetown	MEC	1931	1963	Oil	S	1	1,500	
								1	4,000	
								2	7,500	
								1	10,000	
								1	20,000	50,500
2	Summerside	Summerside	MS	1940	1963	Oil	IC	1	200	
								2	250	
								1	555	
								1	1,135	
								2	2,250	6,890
	Total capacity of plants 1,500 kw. and over (not listed above)									-
	Total capacity of plants under 1,500 kw.									100
	Total (all plants)									57,490

Newfoundland

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	St. John's	St. John's	NLPC	1957	1959	Oil	S	1	10,000	
								1	20,000	30,000
2	Grand Falls	Grand Falls	ANDC	1930	1931	Oil	S	2	5,000	10,000
3	Wabush Lake	Wabush Lake	WM		1963	Oil	IC	4	1,000	4,000
4	Gander (Stand-by)	Gander	DOT	1948	1962	Oil	IC	4	1,000	4,000
5	Labrador City	Carol Lake	IOCC			Oil				3,910
6	St. John's	St. John's	NLPC	1956	-	Oil	IC	1	2,500	2,500

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
NEWFOUNDLAND (Cont'd)										
7	Port aux Basques	Port aux Basques	WCPC	1945	1964	Oil	IC	3	350	
								2	250	
								1	85	
								1	300	1,935
8	Whalesback	Whalesback	BNE	1964	1964	Oil	IC	4		1,910
9	Salt Pond	Salt Pond	UTEC	1964	1964	Oil	IC	3	500	1,500
Total capacity of plants 1,500 kw. and over (not listed above)										4,000
Total capacity of plants under 1,500 kw.										9,572
Total (all plants)										73,327

Northwest Territories

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Port Radium	Port Radium	EMR	1936	1953	Oil	IC	2	150	
								1	864	
								2	650	
								2	400	
								1	175	
								1	200	3,639
2	Frobisher Bay	Frobisher Bay	NCPC	1963	1963	Oil	IC	2	1,000	
							GT	1	1,500	3,500
3	Inuvik	Inuvik	NCPC	1957	1963	Oil	IC	2	375	
								1	150	
								1	960	
								1	1,000	
							S	1	600	3,460
4	Fort Smith	Fort Smith	NCPC	1955	1962	Oil	IC	1	280	
								1	600	
								1	1,000	
								1	400	2,280
5	Hay River	Hay River	NU							1,725
6	Flat River	Flat River	CTMC	1962			IC	3	500	
								1	100	1,600
Total capacity of plants 1,500 kw. and over (not listed above)										-
Total capacity of plants under 1,500 kw.										9,258
Total (all plants)										25,462

Yukon Territory

Total capacity of plants 1,500 kw. and over (not listed above)	
Total capacity of plants under 1,500 kw.	4,320
Total (all plants)	4,320

Canada (TOTAL THERMAL CAPACITY)	6,767,677

OWNER CODE INDEX

This index provides an explanation of the code letters used in the "Owner" column of the preceding tables. The following abbreviations are used for the names of the provinces and territories of Canada:

British Columbia	BC	New Brunswick	NB
Alberta	Alta	Nova Scotia	NS
Saskatchewan	Sask	Prince Edward Island	PEI
Manitoba	Man	Newfoundland	Nfld
Ontario	Ont	Yukon Territory	YT
Québec	Qué	Northwest Territories	NWT

CODE	OWNER	DEVELOPMENTS LOCATED IN
ACL. . . .	Anaconda Company (Canada) Limited.	BC
ACPP. . .	Anglo-Canadian Pulp and Paper Mills Limited.	Qué
AECL. . .	Atomic Energy of Canada Limited.	Ont
AL.	Ayers Limited.	Qué
ALCAN. .	Aluminum Company of Canada Limited.	BC, Qué
ANDC. . .	Anglo-Newfoundland Development Company Limited. . .	Nfld
APPC. . .	Abitibi Power and Paper Company Limited.	Ont
ASC	Algoma Steel Corporation Limited.	Ont
ASRC . . .	American Smelting and Refining Company Limited. . . .	Nfld
BA.	British American Oil Company.	Alta
BCFP. . .	British Columbia Forest Products Limited.	BC
BCHPA. .	British Columbia Hydro and Power Authority	BC
BCSRC. .	British Columbia Sugar Refining Company Limited. . . .	BC
BMPC . .	Bowaters Mersey Paper Company Limited	NS
BNE. . . .	British Newfoundland Exploration Limited	Nfld
BPC. . . .	Bowater Power Company Limited	Nfld
BPPC. . .	Bathurst Power and Paper Company Limited.	NB
BQM . . .	Belleterre Québec Mines Limited	Qué
BRMC . .	Brunner Mond Canada Limited	Ont
CC.	City of Campbellton	NB
CCC. . . .	Columbia Cellulose Company Limited	BC
CCCC. . .	Continental Can Company of Canada Limited.	Ont
CCCL. . .	Canadian Chemical Company Limited.	Alta
CCL. . . .	Canadian Celanese Limited	Que
CDSC. . .	Canada and Dominion Sugar Company Limited.	Ont, Qué
CE.	City of Edmonton	Alta
CFP. . . .	Canadian Forest Products Limited	BC
CGEC. . .	Canadian General Electric Company Limited.	Ont
CGQM . .	Cariboo Gold Quartz Mining Company Limited	BC
CIPC . . .	Canadian International Paper Company.	Qué
CL.	City of Lethbridge	Alta
CMH . . .	City of Medicine Hat	Alta
CMSC. . .	Consolidated Mining and Smelting Co. of Canada Ltd. . .	Sask, BC, NWT
CN.	City of Nelson	BC
CNPC. . .	Canadian Niagara Power Company Limited.	Ont
COR. . . .	City of Revelstoke	BC
CP.	Calgary Power Ltd.	Alta
CPC. . . .	Canada Paper Company	Qué
CPUC. . .	Campbellford Public Utilities Commission	Ont
CR.	City of Regina	Sask
CRL. . . .	City of Rivière-du-Loup	Qué
CRPC. . .	Churchill River Power Company	Sask
CS	City of Sherbrooke	Qué
CSF	Canadian Sugar Factories Limited.	Alta
CTMC . .	Canada Tungsten Mining Corporation Limited	NWT
CU.	Canadian Utilities Limited.	Alta
CW	City of Winnipeg.	Man
CZB. . . .	Crown Zellerbach Building Materials Limited.	BC
CZC. . . .	Crown Zellerbach Canada Limited.	BC
DOSCO. .	Dominion Iron and Steel Company Limited	NS
DOT. . . .	Department of Transport, Government of Canada.	Nfld
DP.	Donnacona Paper Company.	Qué
DPC. . . .	Dryden Paper Company Limited	Ont
DPW . . .	Department of Public Works, Government of Alberta . .	Alta
DT.	Dominion Tar and Chemical Company.	Qué

CODE	OWNER	DEVELOPMENTS LOCATED IN
DTC. . . .	Dominion Textile Company Limited.	Qué
EBEC. . .	E. B. Eddy Company	Ont, Qué
EKPC. . .	East Kootenay Power Company Limited	Alta, BC
ELS. . . .	Eagle Lake Sawmills Company Limited	BC
EML . . .	Électrique de Mont Laurier Limitée	Qué
EMR . . .	Eldorado Mining and Refining Limited	NWT, Sask
ERC. . . .	Electric Reduction Company.	Qué
FC.	Fraser Companies Limited	NB
FMCC . .	Ford Motor Company of Canada Limited.	Ont
FMMC . .	First Maritime Mining Corporation.	Nfld
GCM . . .	Gaspé Copper Mines Limited	Qué
GELW . .	Gananoque Electric Light and Water Supply Co. Ltd. . .	Ont
GLPC. . .	Great Lakes Power Corporation Limited	Ont
GPC. . . .	Gulf Power Company.	Qué
GPP. . . .	Gaspesia Pulp and Paper Company Limited.	Qué
GTR. . . .	Goodyear Tire and Rubber Company Limited.	Ont
HBMS. . .	Hudson Bay Mining and Smelting Company Limited. . . .	Sask
HCL. . . .	Huronian Company Limited	Ont
HEPCO. .	Hydro-Electric Power Commission of Ontario.	Ont
HJP	Hart Jaune Power Company	Qué
HLC. . . .	Hillcrest Lumber Company Limited.	BC
HWS. . . .	Hiram Walker and Sons Limited	Ont
INCO . . .	International Nickel Company of Canada Limited	Man
IOCC . . .	Iron Ore Company of Canada	Qué, Nfld
IPP	Irving Pulp and Paper Limited	NB
JMC . . .	James MacLaren Company Limited.	Qué
KVPC. . .	Kalamazoo Vegetable Parchment Company Limited . . .	Ont
MBPP . .	Minas Basin Pulp and Power Company.	NS
MBPR . .	MacMillan Bloedel and Powell River Limited	BC
MCC . . .	Marathon Corporation of Canada.	Ont
MCL . . .	Mohawk Corporation Limited	Qué
ME.	Municipality of Edmundston	NB
MEC . . .	Maritime Electric Company Limited	PEI
MFLC . .	McFadden Lumber Co. (Domtar)	Ont
MH	Manitoba Hydro	Man
MJ.	Municipality of Jonquière.	Qué
MNBP. . .	Maine and New Brunswick Electrical Power Co. Ltd. . .	NB
MP.	Manicouagan Power Company.	Qué
MQPC . .	MacLaren-Québec Power Company	Qué
MS.	Municipality of Summerside.	PEI
MSC. . . .	Manitoba Sugar Company Limited	Man
NBEPC. .	New Brunswick Electric Power Commission.	NB
NBIPC . .	New Brunswick International Paper Company Limited. .	NB
NCPC. . .	Northern Canada Power Commission.	YT, NWT
NHB. . . .	National Harbours Board, Government of Canada.	Man
NLPC. . .	Newfoundland Light and Power Company Limited.	Nfld
NM	Noranda Mines Limited.	Qué
NRC. . . .	National Research Council, Government of Canada. . . .	Ont
NSLPC . .	Nova Scotia Light and Power Company Limited	NS

CODE	OWNER	DEVELOPMENTS LOCATED IN
NSP. . . .	Nova Scotia Pulp Limited.	NS
NSPC . . .	Nova Scotia Power Commission	NS
NU.	Northland Utilities Limited	Alta
NWPP. . .	North Western Pulp and Power Limited	Alta
OER. . . .	Office de l'Électrification Rurale	Qué
OFM . . .	Ogilvie Flour Mills.	Qué
OHEC. . .	Ottawa Hydro-Electric Commission.	Ont
OMPP . .	Ontario-Minnesota Pulp and Paper Company Limited . .	Ont
OPC. . . .	Ontario Paper Company.	Ont
OVPC. . .	Ottawa Valley Power Company	Qué
OWLP . .	Orillia Water Light and Power Commission	Ont
PAPC. . .	Pan American Petroleum Corporation	Alta
PAPUC. .	Port Arthur Public Utilities Commission	Ont
PBC. . . .	Price Brothers and Company Limited	Qué
PC.	Polymer Corporation	Ont
PELC. . .	Pembroke Electric Light Company Limited.	Qué, Ont
PHPC. . .	Peterborough Hydraulic Power Company	Ont
PP.	Pacific Petroleum Company Limited	BC
PRO. . . .	Province of Ontario	Ont
QCMC . .	Québec Cartier Mining Company	Qué
QDNR. . .	Québec Department of Natural Resources	Qué
QHEC. . .	Québec Hydro-Electric Commission	Qué
QNSPC . .	Québec-North Shore Paper Company	Qué
RC.	Rayonier Canada (BC) Limited	BC
SAPC . . .	Ste. Anne Paper Company Limited.	Qué
SAPCL . .	Saguenay Power Company Limited.	Qué
SCC	Steel Company of Canada Limited	Ont
SCPC . . .	Southern Canada Power Company Limited.	Qué
SFPPC . .	Spruce Falls Power and Paper Company.	Ont
SGM. . . .	Sherritt-Gordon Mines Limited.	Man, Alta
SMPC. . .	Smelter Power Corporation	Qué
SMS	S. M. Simpson Limited	BC
SP	Strathcona Paper Company Limited.	Ont
SPC	Saskatchewan Power Corporation	Sask
SPCL . . .	Seaboard Power Corporation Limited.	NS
STLSA . .	St. Lawrence Seaway Authority	Ont
TFPC. . .	Twin Falls Power Company Limited	Nfld
TPPC. . .	Thurso Pulp and Paper Company.	Qué
UELPC. .	Union Electric Light and Power Company	Nfld
UTEC. . .	United Towns Electric Company Limited	Nfld
WC. . . .	Western Chemicals Limited.	Alta
WCPC . .	West Coast Power Company Limited	Nfld
WKPL . .	West Kootenay Power and Light Company Limited	BC
WM	Wabush Mines	Nfld
WNSE. . .	Western Nova Scotia Electric Company	NS
YCGC. . .	Yukon Consolidated Gold Corporation.	

LEGEND
TRANSMISSION LINES
EXISTING
UNDER CONSTRUCTION
66 KV - 199 KV
200 KV - 299 KV
300 KV - 399 KV
400 KV AND OVER
GENERATING STATIONS
HYDRO-ELECTRIC
THERMAL-ELECTRIC
NOTE ONLY STATIONS WITH TOTAL INSTALLED GENERATING CAPACITIES OF NOT LESS THAN 1,500 KW ARE SHOWN
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
WATER RESOURCES BRANCH
CANADA
MAIN ELECTRIC TRANSMISSION SYSTEMS
AND
PRINCIPAL POWER GENERATING STATIONS
SCALE OF MILES
STATUTE MILES
KILOMETRES

WATER RESOURCES BRANCH

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES

1965

ELECTRIC POWER IN CANADA

ELECTRIC POWER IN CANADA - 1965

Frontispiece:
Dead-end assembly, 735-kv. electric power transmission equipment. Each unit consists of 12 chains of 33 insulators, measures 8 feet in diameter and 43 feet in length and weighs, with hardware, more than 8 tons.

ELECTRIC POWER
IN CANADA · 1965

DEPARTMENT OF MINES & TECHNICAL SURVEYS
WATER RESOURCES BRANCH

Dept. of: Mines & Technical Surveys

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PREFACE

"Electric Power in Canada" presents a general outline of the history of power development in Canada and discusses briefly the availability and distribution of water power and fuel resources. Also presented is a report in detail on progress during 1964 in the development and planning of new power generating facilities and a list of hydro and thermal generating stations with minimum installed generating capacities not less than 1,500 kw.

The Branch acknowledges with thanks the co-operation of the power-producing agencies in every province in Canada in making available the information used in the preparation of this publication. The Branch is indebted also to the Dominion Bureau of Statistics with whom close liaison has been maintained in the collection of information on existing power development.

The map inside the back cover shows main transmission systems and electric power generating stations in Canada.

A series of maps showing similar information in greater detail is available for the following regions:

1. British Columbia, Yukon Territory and Northwest Territories
2. Alberta, Saskatchewan and Manitoba
3. Ontario
4. Québec
5. New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland

These maps are available from:

Director
Water Resources Branch
Department of Mines and
Technical Surveys
Ottawa 4, Ont.

Photographs were provided through the courtesy of the following organizations:

Aluminum Company of Canada Limited
Anglo-Newfoundland Development Company Limited
British Columbia Hydro & Power Authority
Calgary Power Ltd.
City of Winnipeg
Government of British Columbia
Hydro-Electric Power Commission of Ontario
MacMillan Bloedel and Powell River Limited
Manitoba Hydro
New Brunswick Electric Power Commission
Newfoundland & Labrador Power Commission
Northern Canada Power Commission
Nova Scotia Light & Power Company Limited
Québec Hydro-Electric Commission
Saskatchewan Power Corporation
Yukon Alaska Highway Commission

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THE BLACKOUT

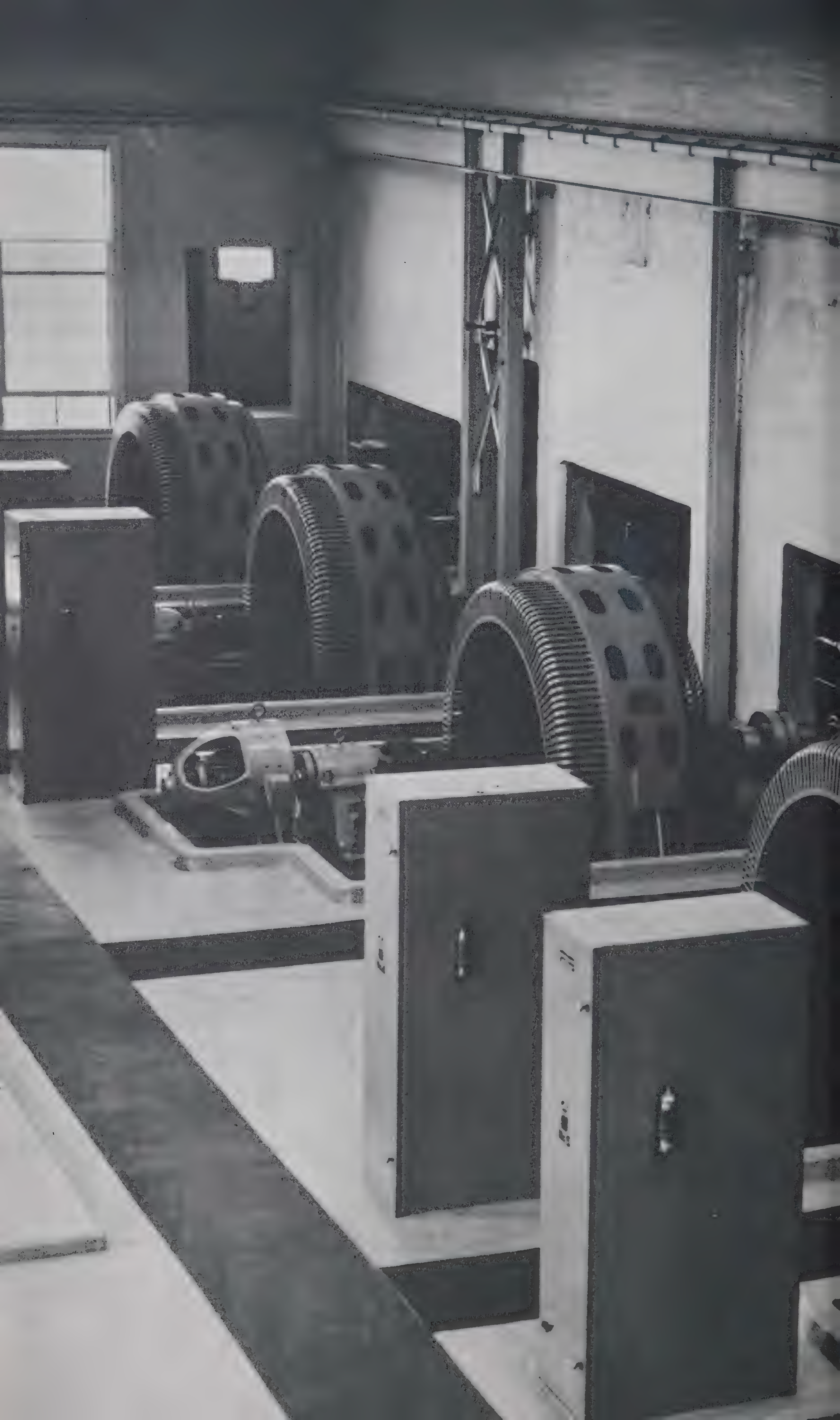
During 1965, Canada continued to make remarkable progress in the development of its electric power industry. Overshadowing this progress, however, was an event associated with the industry which was unplanned, unrehearsed and uninvited, and which came with a suddenness that momentarily crippled important sections of Ontario and spread alarm and industrial paralysis throughout much of the northeastern United States. The event warrants special mention in considering the activities of the electric power industry in 1965.

On November 9 and 10, 1965, an electric power failure occurred throughout most of the northeastern United States and the Province of Ontario. Occurring during a time of day in which there is maximum need for power in an area of great population density, the power failure caused major concern because of its widespread nature and because of the difficulty and delay in discovering its origin.

The disturbance was initiated on one of five main transmission lines carrying power north from Ontario Hydro's Sir Adam Beck developments on the Niagara River. A protective relay on one of the five lines caused the circuit breaker to disconnect the line. The shifting of the flow of power from the disconnected line loaded the four remaining lines beyond the protective level and they, too, tripped-out successively. The sequence of events which followed triggered the breakdown of the single integrated system into several isolated sections and the subsequent blackout which lasted from several minutes in some regions to many hours in others.

While the blackout resulted in considerable hardship and economic loss, it has also sounded a warning to the industry as a whole. Our economy is becoming increasingly dependent upon electric power and the electric power industry, mindful of its responsibilities, must ensure that every part of its facilities are as free as possible from interruptions from any cause.

Measures have been taken to prevent a recurrence of the series of events which culminated in the blackout. The opinion of experts on these measures is summed up in the following statement "While we are unable to say that another blackout of similar magnitude is impossible, we regard the possibility of a recurrence as remote".



DEVELOPMENT OF ELECTRIC POWER IN CANADA

Ambursan Dam at Bishop's Falls hydro plant, Exploits River, Newfoundland.

History of Power Development

The history of electric power development in Canada has been one of remarkable and sustained growth since the beginning of the century. The graph on page 7 illustrates the expansion in installed generating capacity in hydro and thermal stations that has taken place in the last fifty years. Table 1 shows hydro and thermal generating capacity by province at December 31, 1965.

It can be seen from the graph that, although thermal power has made a significant contribution towards satisfying the nation's power needs, hydro power has carried by far the larger part of the burden. This is to be expected when one considers that Canada, in terms of water power resources, is one of the most richly endowed nations in the world.

From a modest total of 133,000 kw. of generating capacity installed at the end of 1900, Canada's total installed hydro capacity rose

TABLE I

Installed Electric Generating Capacity in Canada
at 31 December 1965

Province or Territory	Installed Generating Capacity - kw		
	Hydro	Thermal	Total
British Columbia	2,616,000	1,020,000	3,636,000
Alberta	445,000	959,000	1,404,000
Saskatchewan	320,000	648,000	968,000
Manitoba	1,074,000	339,000	1,413,000
Ontario	6,064,000	3,217,000	9,281,000
Quebec	10,339,000	447,000	10,786,000
New Brunswick	262,000	320,000	582,000
Nova Scotia	143,000	489,000	632,000
Prince Edward Island	-	58,000	58,000
Newfoundland	466,000	75,000	541,000
Yukon Territory	28,000	4,000	32,000
Northwest Territories	35,000	26,000	61,000
CANADA	21,792,000	7,602,000	29,394,000

to the substantial total of almost 21.8 million kilowatts by the end of 1965. In the same period, thermal capacity grew to 7.6 million kilowatts.

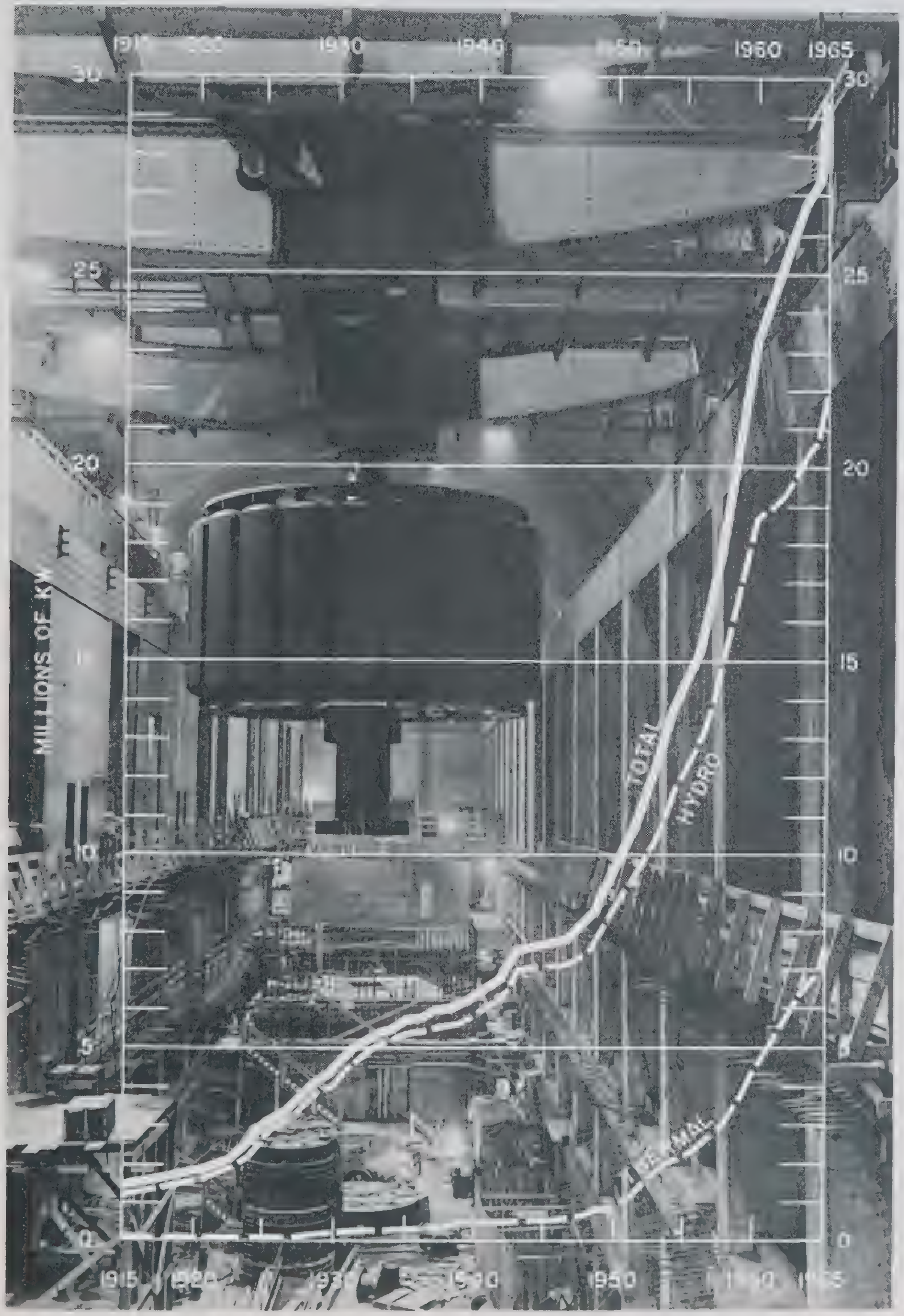
The rate of installation of thermal capacity in the early 1900's was extremely low and until the late 1940's the part played by thermal generating equipment in Canada's power economy was of relatively minor importance. On the other hand, improvements in electric power transmission techniques introduced at the turn of the century and an increasing emphasis on larger hydro plants led to a generally accelerating rate of development of hydro facilities.

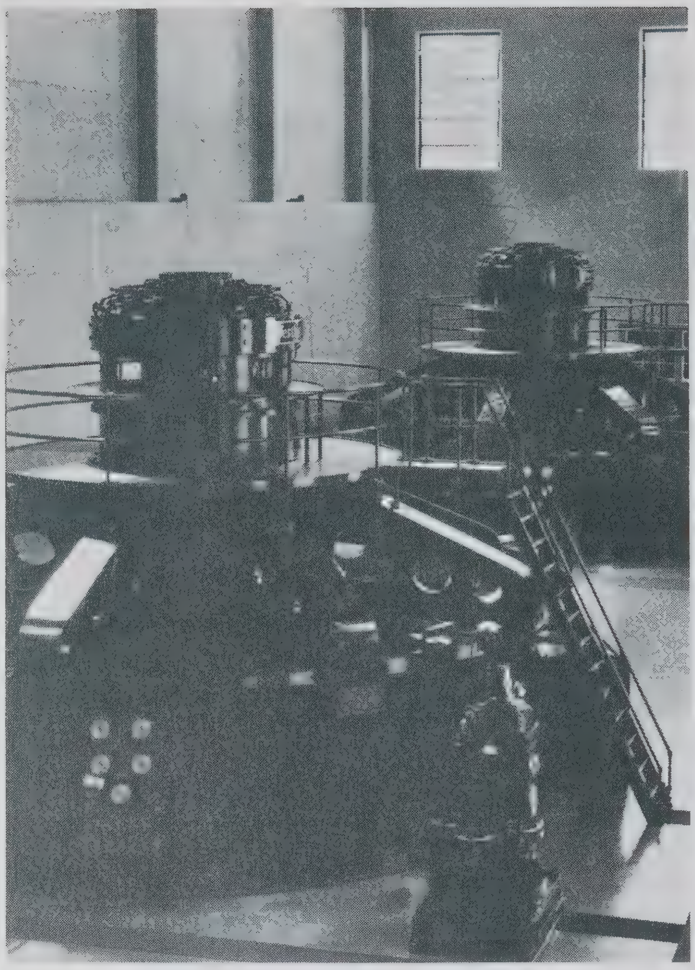
The noticeable jump in the hydro installation rate in the 1920's is a result of the heavy demand for electric power during this prosperous period. The drop in power demand in the depression years of the early 1930's did not show up as a drop in the installation rate until about 1935, due to the time lag which is inherent in hydro-electric power development. Hydro projects initiated prior to the depression years were completed, accounting for the continuation of a high rate of capacity installation up until 1935. Thereafter, poor economic conditions reduced the installation rate in the period 1935-1939.

The tremendous demand for power to drive Canada's war industries was responsible for the sharp rise in installation of new generating facilities between 1940 and 1943. Construction of new facilities dropped off in the later war years, however, so that from 1944 to 1947, a second flattening in the growth curve is evident.

Post-war industrial expansion and rapidly-growing residential and agricultural developments imposed extremely heavy demands on power generating facilities. To stay abreast of these demands required the addition of new generating capacity at a rate higher than at any time in Canada's history. The sharp increase in installed generating capacity that followed could not be satisfied from hydro sources alone and this period marks the beginning of an extensive program of thermal plant construction.

Growth in electric power generating capacity in Canada.





These two generators in the Upper Bonnington hydro plant on the Kootenay River in British Columbia have been in service for almost sixty years.

In the period 1950-1965, the average annual rate of installation of both hydro and thermal facilities has been some 1.2 million kilowatts, with hydro contributing two kilowatts of new capacity for each kilowatt contributed by thermal. It is of interest to note, however, that the average increase in thermal generating capacity over the five years from 1960-1965 has equalled the average increase in hydro capacity and promises to surpass it in the not too distant future.

Current Trends in Power Development

As has been pointed out earlier, water power traditionally has been the main source of electric energy in Canada. This is still true today. Thermal sources, however, are playing an increasingly important role in power supply and undoubtedly will someday supersede water power as the main supplier of electric energy. The choice between development of a hydro-electric power site and construction of a thermal generating station must take into account a number of complex considerations, the most important of which are economic in nature.

In the case of a hydro-electric project, finance charges are high

because of large capital outlays but these are more than offset by low maintenance and operating costs. The long life of a hydro plant and the dependability and flexibility of operation in meeting varying loads are added advantages. Also important is the fact that the water which drives the hydro turbine is a renewable resource.

Probably the most important advantage of the thermal station, on the other hand, is the fact that it can be located close to the demand area, with a consequent saving in transmission costs. With the current trend to large steam stations, however, a certain amount of the flexibility of location of thermal stations is being lost since large steam units require considerable quantities of water for cooling purposes, making it essential that they be sited close to an adequate water supply.

The marked trend to thermal development which became apparent in the 1950's can be explained in part by the fact that in many parts of Canada, most of the hydro-electric sites within economic transmission distance of load centres had been developed and planners had to turn to other sources of electric energy. More recently, however, advances in extra-high-voltage transmission techniques are providing a renewed impetus to the development of hydro power sites previously considered too remote.

Large thermal units require a relatively long starting-up time and consequently tend to lack flexibility of operation. They are at their most efficient, therefore, in meeting conditions of continuous load. Hydro stations, on the other hand, can put generating units on line with a minimum of delay and hence are admirably suited to supply power to meet the peak loads which may occur several times each day. By combining the advantages of both hydro and thermal stations in integrated supply systems, power producers are now achieving a markedly greater flexibility of operation.

The trend towards larger, more economical thermal-electric units has a detrimental effect on the amount of reserve capacity required to maintain the uninterrupted service that customers have come to expect and rely on. It is evident, however, that as the size of an operating system expands through load growth or through interconnection with other systems, the size of any one unit in relation to the total system capacity becomes less, and the proportion of capacity required for reserve is reduced.

Another trend in development designed to meet the problem of varying daily loads is the use of pumped storage. An example is the Sir Adam Beck hydro development at Niagara Falls. At this development, water taken from the Niagara River above the Falls is carried by means of a tunnel and a power canal to the penstocks which supply the main generating station on the bank of the Niagara River some distance below the Falls. In off-peak hours, surplus power from the main station is used to pump water from the power canal into a reservoir maintained at a higher level. During peak-load hours, the pumps, which are dual-

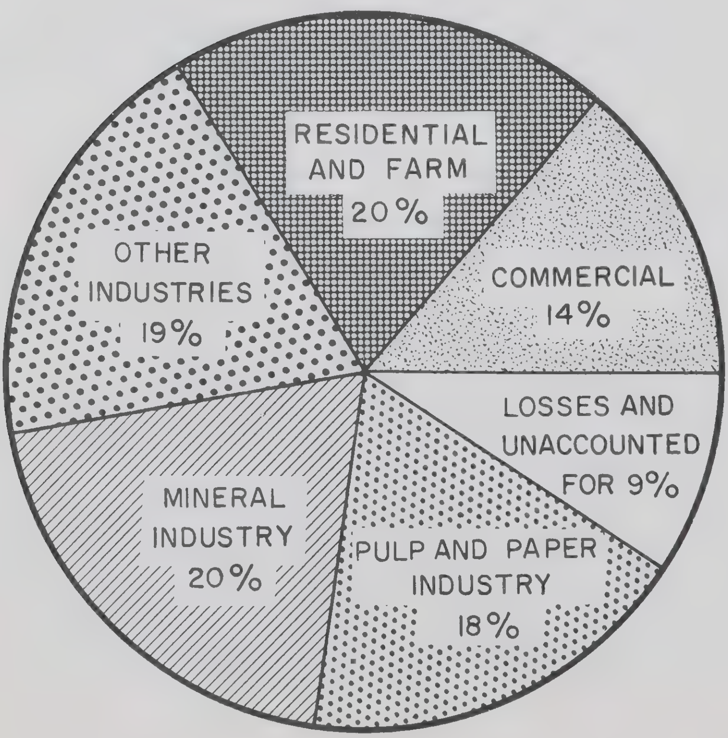
purpose units, operate as generators and are driven by water released from the reservoir. The pumping-generating units at the Sir Adam Beck development make available an extra 176,700 kw. of generating capacity. A pumping-generating station using the same general principal is under construction on the Brazeau River in Alberta as part of the 338,440-kw. Big Bend hydro development.

Perhaps the most promising application of the pumping-generating principle is its use in conjunction with nuclear power stations. Nuclear units, in common with the larger conventional thermal units, can be used most efficiently under conditions of continuous operation. Off-peak nuclear power can be used to operate pump-turbine units as previously described and the hydro-electric power derived from operating the units as generators is available for use during periods of peak demand.

Utilization of Electric Power

In 1965, Canada's generating facilities produced a total of 143,160,958,000 kilowatt-hours of electric energy, after allowing for the energy used in the power stations themselves. Of this total, 116,712,297,000 kwh. was produced in hydro-electric stations and 26,448,661,000 kwh. in thermal stations. Energy imported from the United States exceeded by 7,407,000 kwh. the energy exported to the United States during the year, bringing to 143,168,365,000 kwh. the total energy made available.

The diagram below illustrates how this energy was used.



Principal uses of electric energy in Canada.

Chemical and fertilizer plant, Warfield, British Columbia.

Industry uses approximately 57 per cent of the total electric energy made available in Canada; residential and farm use accounts for 20 per cent and commercial use 14 per cent. The remaining 9 per cent is listed under "losses and unaccounted for". Because many power producers do not distinguish in their records between residential and farm customers, the amount of energy used is shown as a combined total. A small amount of energy used for street lighting, slightly less than one per cent of the total energy made available, is included in the "commercial" category.

Industries

About 20 per cent of the total energy made available in Canada is used in the mineral industry, including smelting and refining, 18 per cent by the pulp and paper industry and 19 per cent by other industries. The chemical industry and the primary iron and steel industry together consume almost one-half of the total amount used by the "other industries".

Approximately seventy-five per cent of the energy consumed by the mineral industry in Canada is used in the smelting and refining of metals.

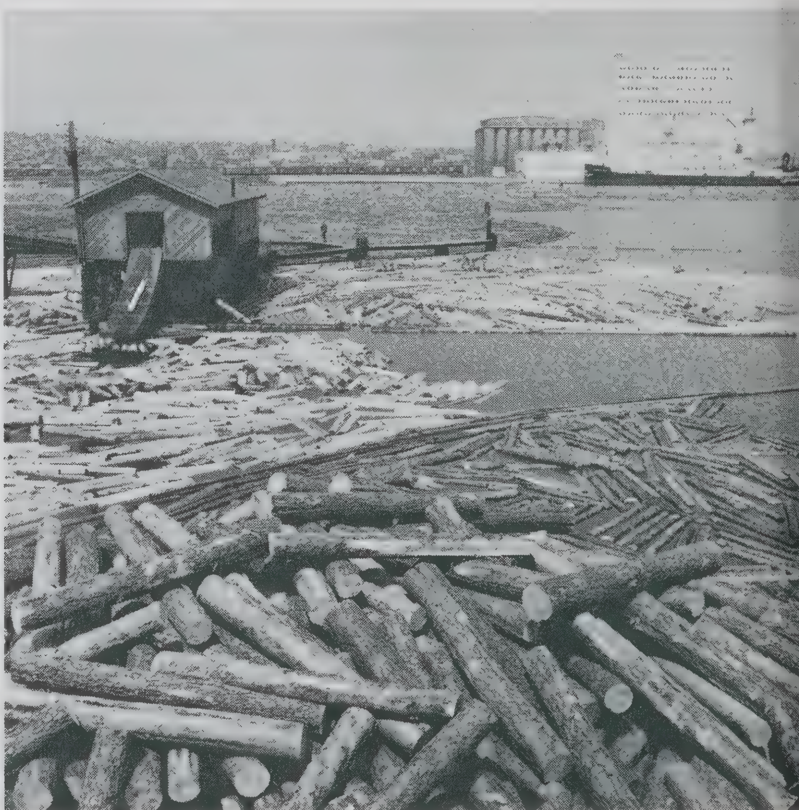
Canada has no known deposits of bauxite but the availability of low-cost hydro-electric power has fostered the establishment of an aluminum industry which produces one-quarter of the world's supply of

this metal. Further evidence of the value of water power to mining operations is provided by the fact that Canada's asbestos industry, which produces approximately half of the total world supply of asbestos, obtains the major part of its power supply from hydro-electric sources.

The incidence of large water power resources in those regions in which the more important mineral deposits have been found has greatly facilitated mining development. Recent examples are the nickel mining and refining complex at Thompson, Manitoba, which uses hydro power generated in the Kelsey plant on the Nelson River, and the iron ore mining operations in Labrador supplied by the Twin Falls plant on the Unknown River.

Metal mining, a very important division of the Canadian mining industry, is carried on mainly in two physiographic regions, the Western Cordillera and the Canadian Shield. In the Western Cordillera, the mountainous topography and the relatively high amounts of precipitation favour the development of water power. In the Canadian Shield, which is a Precambrian formation stretching in a wide sweep around Hudson Bay from the Mackenzie River basin to the eastern tip of Labrador, heavy glaciation in recent geological times has formed river systems which are comparatively young and are characterized by large numbers of lakes connected by short river sections with numerous rapids and falls suitable for development as hydro-electric power sites.

The pulp and paper industry in Canada is one of the world's great industrial enterprises. Total mill capacity for the production of newsprint paper is considerably greater than that of any other country in the world and in total production of wood pulp, Canada is second only to the United States.



Pulpwood en route to the mills is a familiar sight in many parts of Canada.

The fact that over 90 per cent of the manufactured newsprint is exported gives some indication of the importance of the industry to Canada's export trade program.

By far the larger portion of the energy used in the pulp and paper industry is derived from water power.

Power and Population

The figures in Table 2 illustrate for each Province and Territory, and for Canada as a whole, the estimated population, the net total electric energy generated and the per capita electric energy generated.

TABLE 2

Power and Population - 1965

Province or Territory	Estimated Population	Net Total Electric Energy Generated 1,000's kwh	Per Capita Electric Energy Generated kwh
British Columbia	1,818,000	18,162,719	9,990
Alberta	1,454,000	5,496,395	3,780
Saskatchewan	953,000	3,689,069	3,870
Manitoba	960,000	5,513,379	5,740
Ontario	6,794,000	44,733,205	6,580
Quebec	5,692,000	56,902,219	10,000
New Brunswick	625,000	2,953,690	4,730
Nova Scotia	760,000	2,605,238	3,430
Prince Edward Island	108,000	136,591	1,260
Newfoundland	501,000	2,717,297	5,420
Yukon and N.W.T.	40,000	251,156	6,280
CANADA	19,705,000	143,160,958	7,270

During 1965, a net total of 143,161 million kilowatt-hours of electric energy was generated by the electric industry, about 57 per cent of the amount which in theory could be generated if the 29,394,000 kw. of generating capacity installed at the end of 1965 was operating continuously.

Water Power Resources of Canada

Table 3 presents a summary of developed water power in Canada and an estimate of undeveloped water power potential, based on records maintained by the Water Resources Branch.

TABLE 3

WATER POWER RESOURCES OF CANADA

at 31 December 1965

Province or Territory	Undeveloped Water Power			Developed Water Power
	Available Continuous Power at 88% Efficiency			Installed Generating Capacity kw
	at Q95(a) kw	at Q50(b) kw	at Qm(c) kw	
British Columbia	4,946,000	16,635,000	24,665,000	2,616,000
Alberta	895,000	3,244,000	4,866,000	445,000
Saskatchewan	773,000	1,298,000	1,559,000	320,000
Manitoba	2,964,000	5,501,000	5,853,000	1,074,000
Ontario	467,000	1,102,000	1,663,000	6,064,000
Québec	8,500,000	25,800,000	32,500,000	10,339,000
New Brunswick	62,000	221,000	497,000	262,000
Nova Scotia	21,000	112,000	165,000	143,000
Prince Edward Island	-	1,000	2,000	-
Newfoundland	1,240,000	3,635,000	4,871,000	466,000
Yukon Territory	664,000	3,237,000	5,689,000	28,000
Northwest Territories	864,000	2,232,000	3,322,000	35,000
CANADA	21,396,000	63,018,000	85,652,000	21,792,000

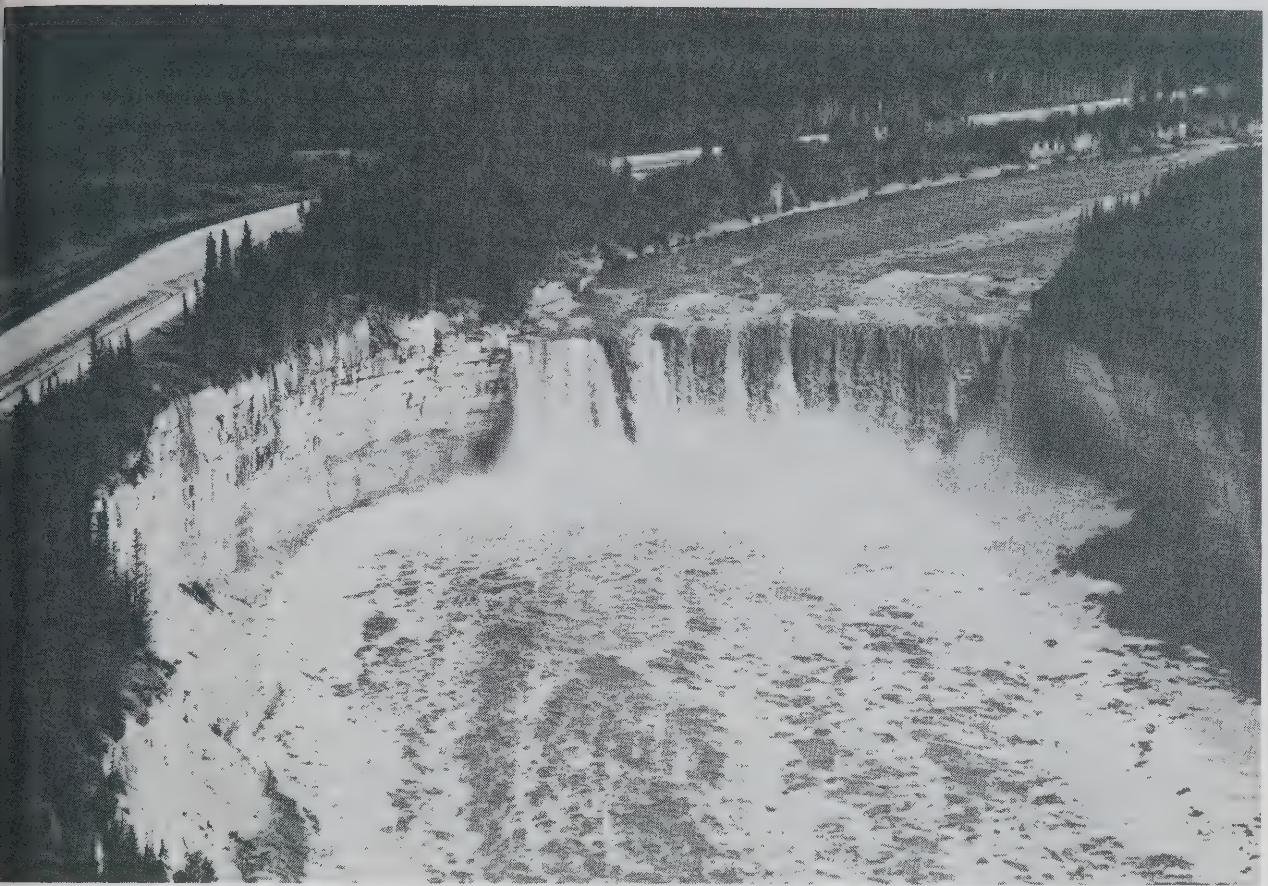
(a) - Power equivalent of flow available 95 per cent of the time.

(b) - Power equivalent of flow available 50 per cent of the time.

(c) - Power equivalent of arithmetical mean flow.

NOTE: The totals of undeveloped water power for British Columbia and Yukon Territory published in the 1964 issue of Electric Power in Canada were in error. The figures shown in Table 3 above incorporate an appropriate correction.

Previously, the Branch followed the practice of presenting combined estimates of developed and undeveloped power at Canada's known water power sites under the general heading "Available Continuous Power". The method of presenting these statistics adopted in Table 3 is considered to be of more practical value. Estimates of available power are shown for undeveloped sites only; for developed sites the total



The 109-foot Alexandra Falls on the Hay River, Northwest Territories.

generating capacity actually installed is indicated. It should be emphasized that the capacity installed at an existing hydro-electric development frequently is in excess of the continuous power available at the site. The relationship between installation and available power is explained more fully later in this section.

Undeveloped Water Power

Column 2 of Table 3 lists the estimated continuous power ordinarily available during periods of low discharge under existing conditions of river flow. These estimates are based upon Q95, which is the natural or modified flow available 95 per cent of the time.

Column 3 lists the estimated dependable maximum power based upon Q50, the natural or modified flow available for at least 50 per cent of the time.

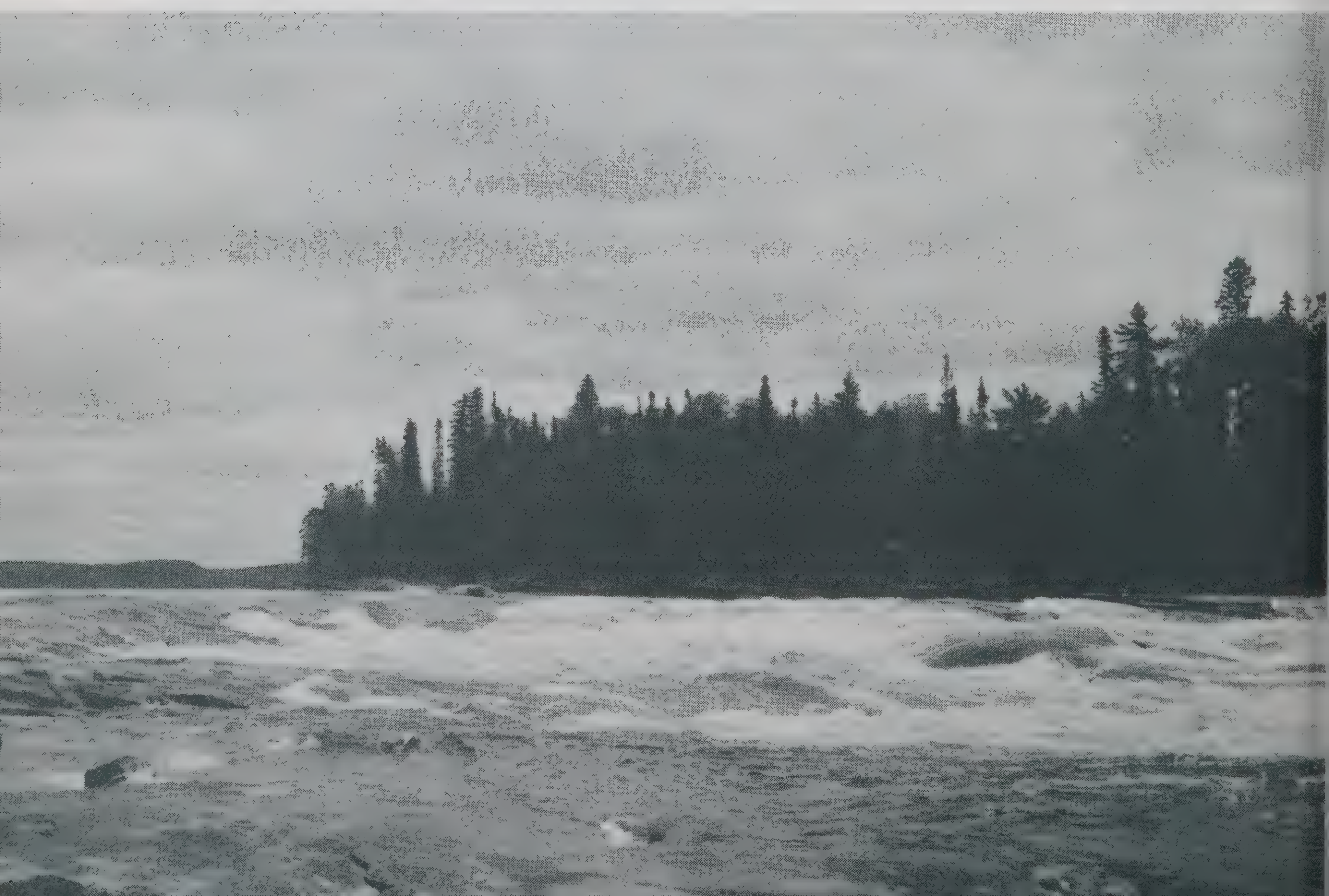
Column 4 lists the estimated dependable maximum power based on Qm, the arithmetical mean flow.

On rivers for which flow records are sparse or non-existent, estimates of flow are made from available information relating to runoff in the same general area.

As a rule, the figures of undeveloped water power at the various rates of flow reflect only the potentials of undeveloped sites which at present are considered feasible for development. Preliminary figures for Québec supplied by the Québec Department of Natural Resources, however, reflect the net river power potential which would result from development of the entire head available on that province's rivers.

It should be emphasized that the figures of undeveloped water power in Columns 2 and 3 represent only the minimum water power possibilities in Canada. The reason for this is that the estimates are based upon existing river flows, which for the most part do not reflect the benefits of streamflow regulation that would result from the development of storage potential. The figures in Column 4, on the other hand, are determined from the arithmetical mean flow and represent the power which would be obtainable if the entire flow in the river could be regulated to provide a continuous flow of constant magnitude. It can readily be seen that, because the latter condition assumes complete regulation, estimates of potential based upon arithmetical mean flow will, if other pertinent factors are neglected, exceed the amount of installed capacity that might be expected to be installed at the site, particularly where little or no storage is available. Recent experience in the development of water power sites, however, has indicated that in fact, the generating capacities installed at many sites are very considerably in excess of what might be dictated by even the arithmetical mean flow.

Maynard Falls on the English River, Ontario.



Aerial view of the Yukon River south of Stewart River, Yukon Territory.

Estimates of the magnitude of undeveloped water power resources have been revised substantially upwards as a result of a recent major review of the water power inventory of Canada. The estimates will continue to be revised from time to time as more complete information becomes available, particularly on rivers in the more remote northerly areas.

Several major river diversion possibilities exist, particularly in British Columbia, where topographical conditions make possible such rearrangements of flow. The estimates of potential of British Columbia's undeveloped hydro resources have been altered recently to include figures based upon the diversion of rivers which, if they are developed at all, will almost certainly be developed on a combined-river basis.

Developed Water Power

The figures of installed generating capacity shown in Column 5 of Table 3 are based upon the manufacturer's rating in kilowatts as shown on the generator name-plate, or derived from the rating where it is indicated in kilovolt-amperes.

The maximum economic installation at a power site can be determined only by careful consideration of all the conditions and circumstances pertinent to its individual development. It is the usual practice, however, to install units which have a combined capacity in excess of the available continuous power at Q50, and frequently in excess of the power available at Qm. There are a number of reasons for this.

The excess capacity may be installed for use at peak-load periods, to take advantage of periods of high flow, or to facilitate plant or system maintenance. In some instances, storage dams have been built subsequent to initial development to smooth out fluctuations in river flows. In other cases, deficiencies in power output during periods of low flow have been offset by auxiliary power supplied from thermal plants, or by inter-connection with other plants which operate under different load conditions or are located on rivers with different flow characteristics.

The extent to which the installed capacity exceeds the available continuous power at the various rates of flow thus is dependent upon the factors which govern the system of plant operation, and varies widely in different areas of the country. In some developments, the difference may amount to several hundred per cent. For this reason, discretion should be used in comparing the figures in Column 5 with those in Columns 2, 3 or 4, as available continuous power and installed capacity are not directly comparable. As a rough guide, however, it may be assumed that the power equivalent of the flow at Q50 represents an approximate, if conservative, estimate of hydro generating capacity remaining to be installed in Canada.

Water Power Distribution in Canada

Table 3 indicates the distribution of undeveloped water power resources and installed generating capacity in Canada. A review of the table shows that substantial amounts of water power have been developed in all provinces except Prince Edward Island, where water power resources are meagre. As the development of Canada's natural resources proceeds, the fortunate incidence of water power in proximity to mineral deposits, pulpwood and other natural resources becomes increasingly apparent. There is little doubt that the existence of large amounts of potential hydro power on northern rivers will prove to be a factor of prime importance in the eventual realization of the natural wealth of Canada's north.

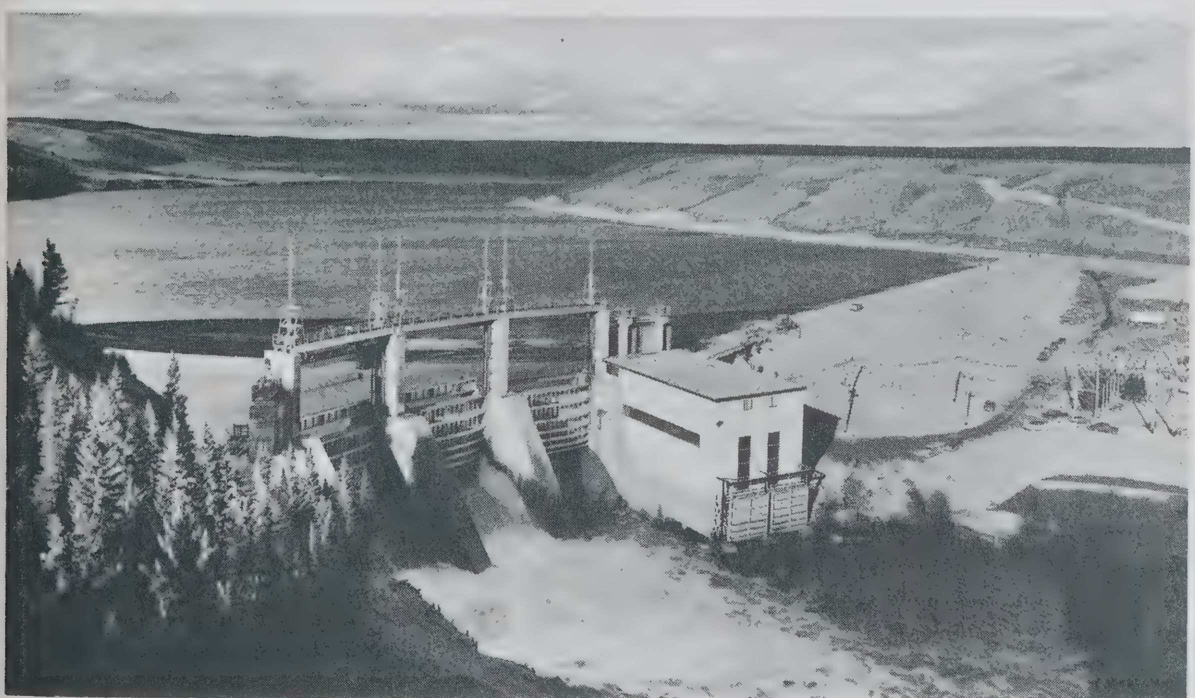
BRITISH COLUMBIA, traversed by three distinct mountain ranges and with, generally speaking, a high rate of precipitation, has many mountain streams which offer abundant opportunity for the development of hydro-electric power. In terms of recorded available water power resources, developed and undeveloped, the province ranks second in Canada and in the amount of generating capacity installed, is exceeded only by Québec and Ontario.

Notable for the magnitude of their power potential are such rivers as the Columbia, Fraser, Peace and Stikine. Up to the present, however, hydro-electric developments on smaller rivers in the southern part of the province have been called upon to satisfy the major load requirements of British Columbia. The immense power resources of the Peace River

are now being harnessed and by 1968 will supply energy to the southern part of the province. Development of the Columbia River, now well under way, is designed to provide initially three huge storage reservoirs and eventually to make available a significant amount of "at site" power in the Canadian portion of the basin.

The foremost producer and distributor of electric power in British Columbia is the provincially-owned British Columbia Hydro and Power Authority.

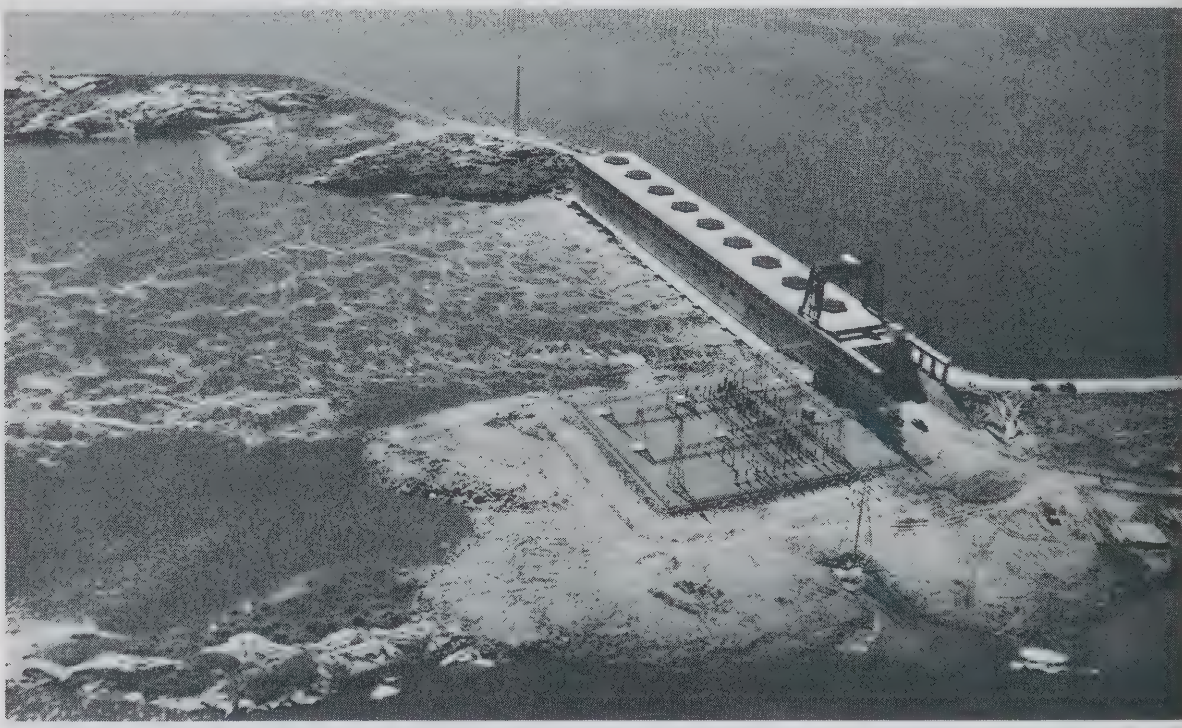
In ALBERTA, the principal hydro-electric developments are located on the Bow River and its tributaries, and from these developments, Calgary Power Ltd. serves most of the southern part of the province. In 1965, energy from a large hydro unit on the Brazeau River in the headwaters of the North Saskatchewan River came on line, augmenting the energy from the Bow River plants. Substantial water power resources are located in northern regions of the province, and although these are somewhat remote from present centres of population, the advent of extra-high-voltage transmission has enhanced the prospect of their development.



Bearspaw hydro development on the Bow River, Alberta.

In SASKATCHEWAN, large water power resources exist in the central and northern parts of the province, principally on the Churchill, Fond du Lac, and Saskatchewan Rivers. In 1963, power from Squaw Rapids, the first hydro development on the Saskatchewan River, was fed

into the transmission network of the provincially-owned Saskatchewan Power Corporation, which serves the more settled areas of the province. These areas previously had been served by electric power from thermal-electric plants fuelled by coal, oil or natural gas, while hydro-electric power generated in the province had been used almost exclusively for mining purposes in northern areas.



McArthur generating station on the Winnipeg River, Manitoba.

Of the three Prairie Provinces, MANITOBA, with immense hydro-electric capabilities on the Winnipeg, Churchill, Nelson and Saskatchewan Rivers, is the most generously endowed with water power resources. Until recently, hydro-electric generating stations on the Winnipeg River supplied most of the electric power requirements in southern Manitoba. Manitoba Hydro's high-voltage, long-distance transmission lines, however, will carry ever-increasing amounts of power south from hydro-electric stations on northern rivers to help meet the province's constantly growing power demands.

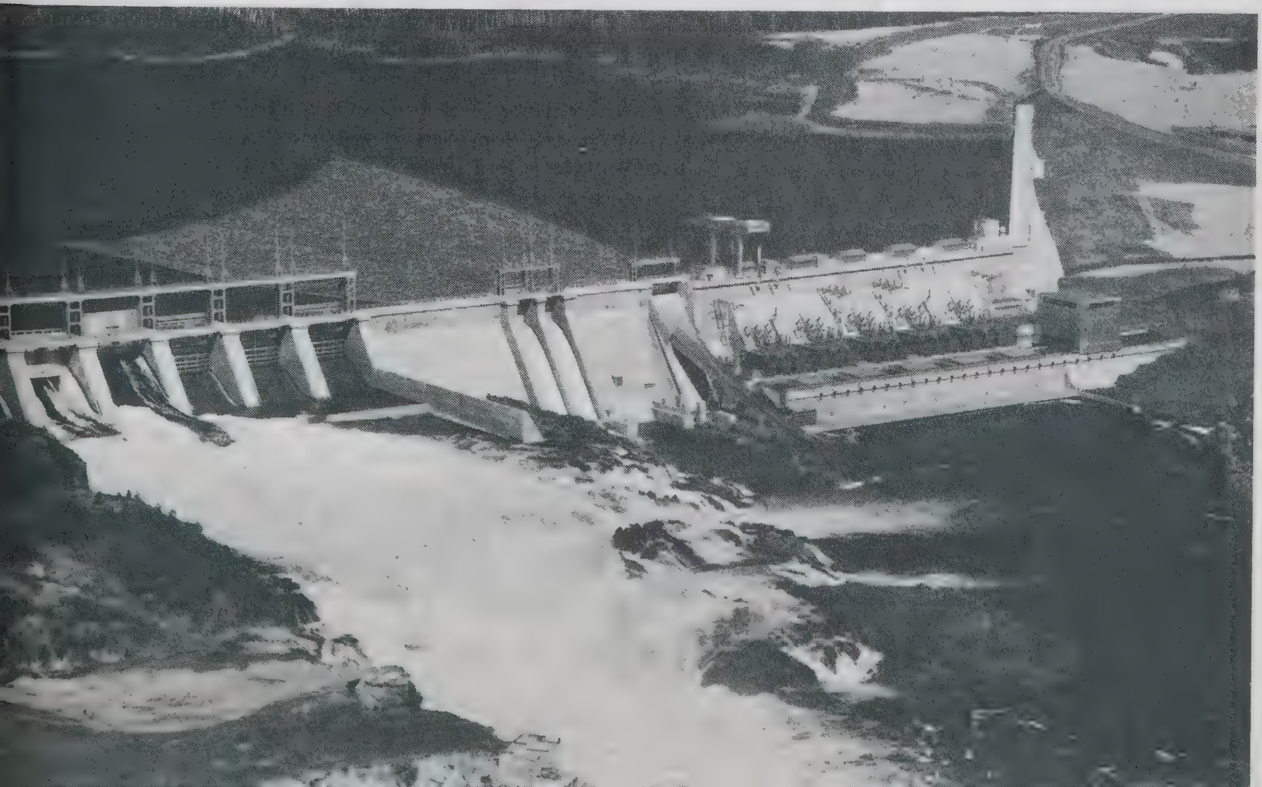
Almost all of the sizeable water power potential in ONTARIO, within easy reach of load centres has been developed and planners have been looking to the more remote sites as new sources of supply. Centred in the northeastern region since 1958, construction activity is adding the final touches to this stage of the James Bay power complex, whose development has been made feasible through recent improvements in long-distance transmission techniques. Activity is shifting back, however, from the James Bay region to the more southerly areas where several sites suitable for the development of peaking power are under construction

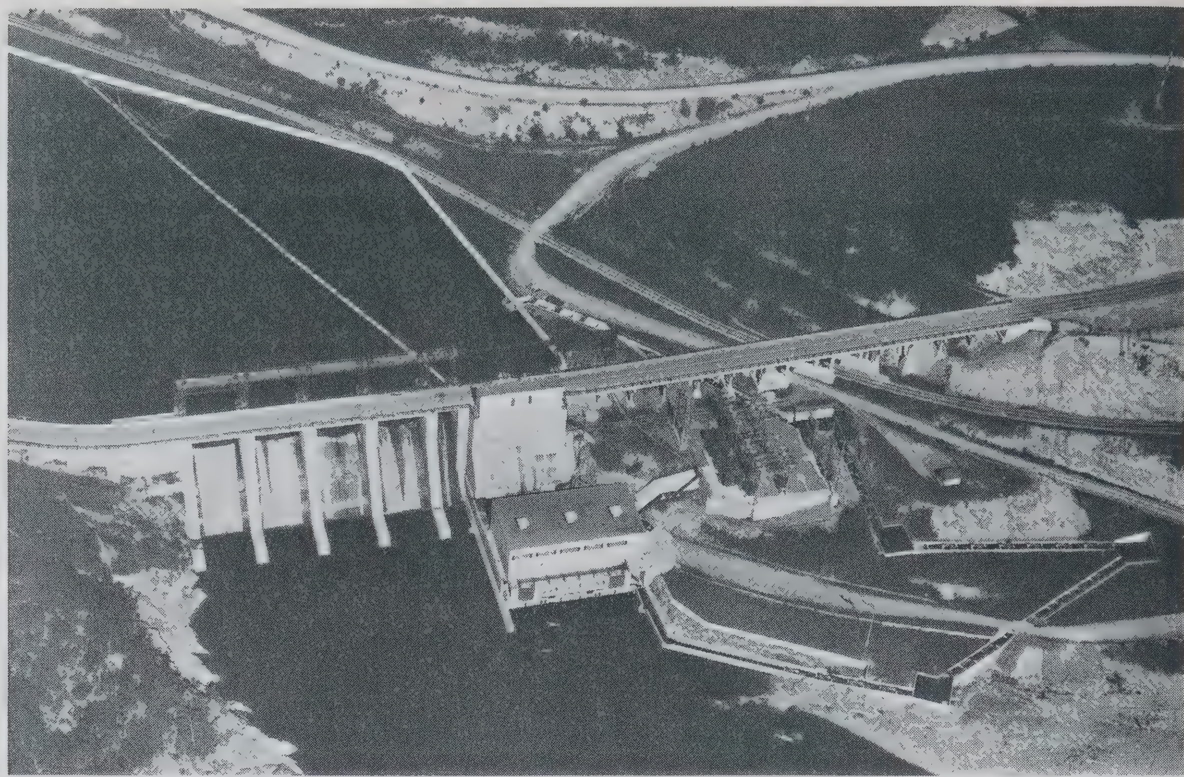
or extension. Several other sites are under investigation in the region north of Lake Huron and in the headwaters of the Ottawa River basin. Most of the hydro-electric power produced in the province comes from the generators of the Hydro-Electric Power Commission of Ontario, Canada's largest power producing and distributing organization. Ontario's largest generating station is located on the Niagara River at Queenston, where the Sir Adam Beck - Niagara Generating Stations Nos. 1 and 2, and the associated pumping - generating station have a combined generating capacity of 1,804,200 kw. In addition to the power generated in its own plants, the Commission purchases large amounts of electric power generated outside the province, chiefly in Québec.

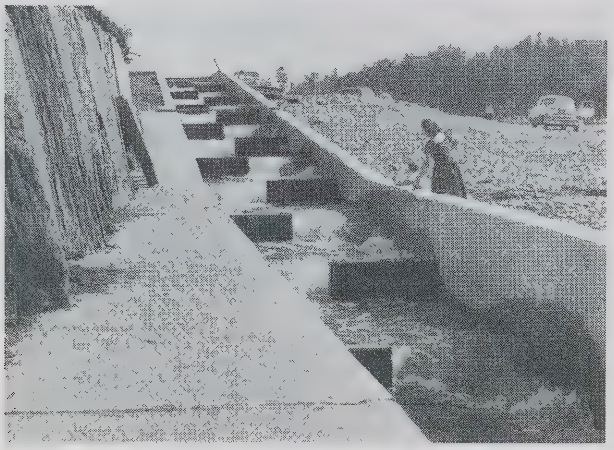
QUÉBEC is richest of all the provinces in water power resources, possessing more than 40 per cent of the total recorded for Canada. Québec also leads in developed water power - its present installation of 10.3 million kilowatts representing about 48 per cent of the national total. The largest single hydro-electric installation in Canada is the Québec Hydro-Electric Commission's 1,574,260-kw. Beauharnois development on the St. Lawrence River. Also notable are the Commission's Bersimis I development on the Bersimis River with an installed capacity of 912,000 kw. and the Aluminum Company of Canada Limited 742,500-kw. Chute des Passes plant on the Peribonka River. A major power scheme which represents a significant advance in the development of Québec hydro-electric resources is now under construction. This scheme, involving the harnessing of the headwaters of the Manicouagan and Outardes Rivers, will permit the eventual installation of some 5.8 million kilowatts on the two rivers.

Power production in the province is facilitated by the regulation of streamflow by the Québec Department of Natural Resources through the storage dams which it owns and operates. In 1965, some of the responsibility for regulation was transferred to the Québec Hydro-Electric Commission.

Chute-à-la-Savanne hydro plant on the Peribonka River, Quebec.







Above:
Tobique hydro plant on the Tobique River, New Brunswick.

Left:
The first channel of the fishway constructed around the 80-foot high dam at the Tobique hydro plant.

The water power resources of NEW BRUNSWICK and NOVA SCOTIA, although small in comparison with those of other provinces, are a valuable source of energy and make a substantial contribution to the economies of the two provinces. Numerous rivers in both provinces provide moderate-sized power sites either within economic transmission distance of the principal cities and towns or advantageously situated for use in development of the timber and mineral resources. These provinces are also favoured with abundant indigenous coal supplies. In PRINCE EDWARD ISLAND, there are no large streams and water power plants are limited in size to those used to operate small mills.

The water power resources of NEWFOUNDLAND, determined on the basis of the limited available streamflow data, are estimated to be of very considerable magnitude. On the island, although the length of the rivers is generally not great, topography and runoff are favourable for hydro-electric power development. Of the substantial capacity installed, a very large portion serves the pulp and paper industry. In Labrador, the Churchill River and its tributaries, for the most part undeveloped,

constitute one of the largest sources of water power in Canada.

The YUKON TERRITORY and NORTHWEST TERRITORIES, which together comprise most of Canada's northland, possess extensive water power resources. Power from present developments is used almost exclusively to satisfy the needs of local mines and adjacent settlements. Due to the lack of developed native fuel sources and to transportation difficulties, water power is of special importance in the development of mining areas such as Yellowknife in the Northwest Territories and Mayo in Yukon Territory. In 1948, to encourage the development of the resources of northern Canada, the Federal Government established what is now the Northern Canada Power Commission, to be responsible for the construction and management of public utility plants. The Deputy Minister of Northern Affairs and National Resources is Chairman of the Commission and the Director of the Water Resources Branch is a Member.

In YUKON TERRITORY, most of the resources are located on the Yukon River and its tributaries. The possibility exists of diverting the headwaters of the Yukon River through the Coast Mountains and concentrating the head in a development near tidewater in northern British Columbia. Such a development, however, would affect adversely the potential of sites on the main river.

Resources in the NORTHWEST TERRITORIES have not been surveyed to the same extent as those in Yukon Territory, but they are nevertheless known to be of considerable magnitude. Extensive water power resources exist on rivers flowing into Great Slave Lake and the Mackenzie River. Of major significance is the hydro-electric potential of the South Nahanni River, which drains to the Mackenzie River via the Liard River. On the basis of preliminary investigations, it is estimated that, with total regulation and complete use of the head susceptible of development, the hydro-electric potential of the South Nahanni River would total close to one million kilowatts. Indications are that the rivers draining the District of Keewatin, north of Manitoba, also will contribute materially to the total power potential of the Northwest Territories.

Thermal Power Development in Canada

The incidence of immense water power resources in Canada and the brisk pace of their development has tended to overshadow the very considerable contribution being made by thermal energy in the nation's power economy. At the end of 1965, the total installed thermal generating capacity in Canada was 7,602,000 kw., about 26 per cent of the total of all electric generating capacity in the country. The fact that energy produced in thermal plants during the year accounted for only 18 per cent of the total may be attributed in part to the fact that a considerable

amount of the capacity installed is maintained for stand-by purposes.

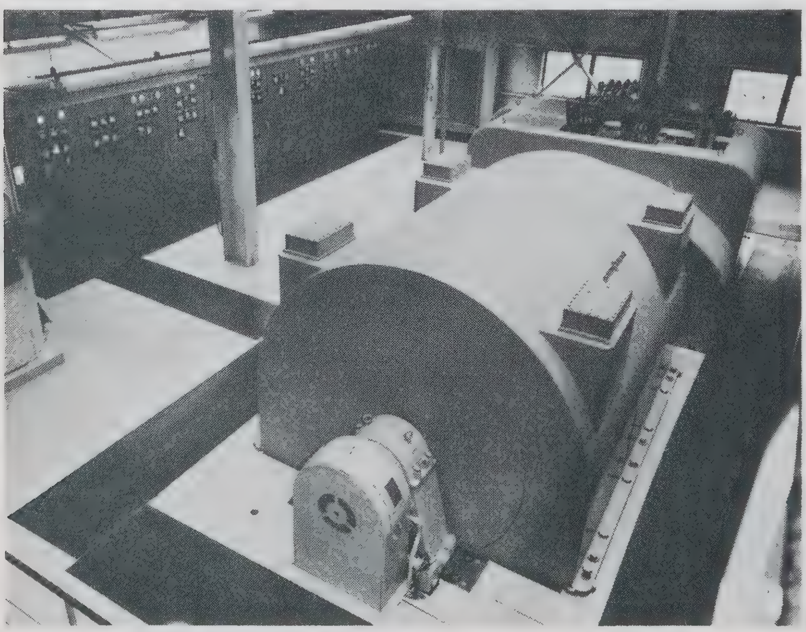
As has been stated earlier in this report, however, the current emphasis on thermal plant construction is one which is likely to continue and to become more marked as development of the nation's water power reserves becomes more complete.

Conventional Thermal Power

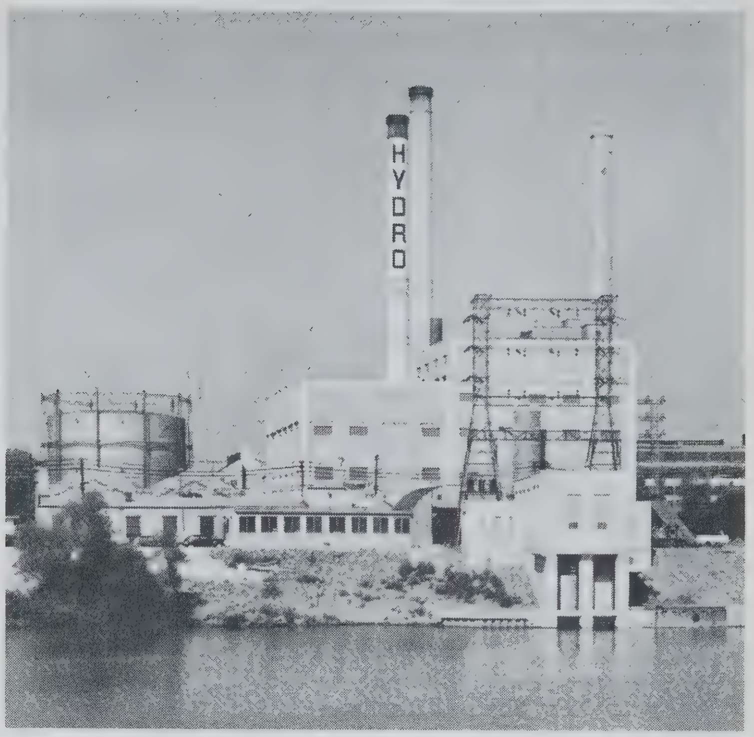
Thermal Generating Stations

Approximately 85 per cent of all the conventional thermal power generating equipment in Canada is driven by steam turbines. The magnitude of the loads now being carried by steam plants has led to the installation of steam units with capacities as high as 300,000 kw. Even larger units of 500,000-kw. capacity, will go into service within the next two or three years. The remainder of the load is carried by gas turbine and internal combustion equipment. The flexibility of internal combustion engines make this type of equipment particularly suitable for meeting power loads in smaller centres, especially in the more isolated areas.

The figures in Table 1 indicate that the provinces of Alberta, Saskatchewan, Nova Scotia and Prince Edward Island depend upon thermal capacity for most of their power requirements. New Brunswick has slightly more thermal than hydro. In Ontario, where the present hydro capacity is about twice the thermal, forecasts based upon present construction schedules indicate that by the early 1970's the province's total installed thermal capacity will have overtaken hydro.



Steam turbo-generator at Harmac thermal plant, Nanaimo, British Columbia.



Thermal generating station and central steam heat plant, Winnipeg, Manitoba.

More than half of BRITISH COLUMBIA'S thermal generating capacity is installed in three plants located in the Vancouver area. The capacity of the largest of these plants, the 450,000-kw. Burrard generating station, is expected to be increased to 600,000 kw. by 1967. The addition of a further 300,000 kw. at Burrard may, however, be delayed by the availability of Peace River power in 1968.

The incidence of vast fuel resources in ALBERTA accounts for the emphasis on thermal power generation in the province. Alberta's largest thermal plants are the 330,000-kw. gas turbine and steam station at Edmonton and the 282,000-kw. Wabamun steam station. While large amounts of both hydro and thermal capacity are now under construction, development projected over the next few years will be predominantly thermal.

Until recently, SASKATCHEWAN has relied upon thermal capacity to satisfy the needs of the more settled areas, hydro-electric power generated in the province being used almost exclusively for mining purposes in northern areas. Within the last few years, however, development of storage on the South Saskatchewan River has fostered the development of hydro-electric power on the main Saskatchewan River. At present, the province is concentrating on the installation of additional hydro capacity on the Saskatchewan and South Saskatchewan Rivers but has also awarded contracts for major extension to the Boundary Dam thermal station.

MANITOBA supplements its predominantly hydro-based power supply with a substantial amount of thermal capacity. At the present time, however, the emphasis is on development of the province's water power resources.

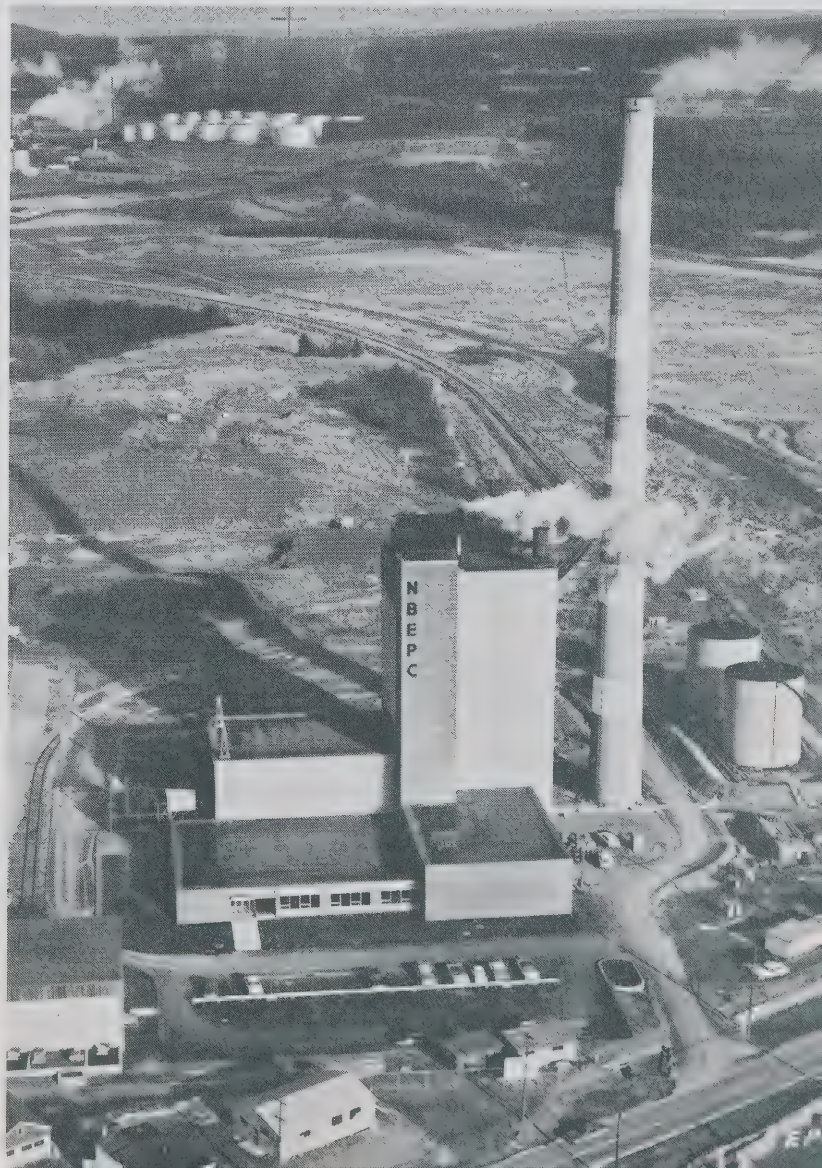
Thunder Bay thermal plant, Fort William, Ontario.

ONTARIO has more thermal capacity than any other province in Canada. The thermal capacity installed in the province at the end of 1965 totalled 3,217,000 kw., approximately 42 per cent of the national total. With another 3.2 million kilowatts of conventional thermal capacity and 1.4 million kilowatts of nuclear thermal capacity scheduled for service in Ontario in the period 1966-1971, the province's share of the national total promises to increase considerably. Until 1965, Ontario Hydro's 1,200,000-kw. Richard L. Hearn generating station near Toronto was the largest thermal station in Canada. In 1965, the capacity of Ontario Hydro's Lakeview plant also was raised to 1,200,000 kw. Lakeview, scheduled for expansion to 2.4 million kilowatts by 1968, consists of four 300,000-kw. units, the largest in operation in Canada. Larger units of 500,000 kw. each are planned for the Commission's Lambton station designed for a total capacity of 2 million kilowatts in four units, for installation between 1968 and 1971. A modest but unique addition to Ontario Hydro's generating resources was effected late in 1965 with the installation of six oil-burning combustion turbine generator sets. Located at Toronto and Sarnia, the combine capacity of 95,000 kw. will be used only to provide standby service and operational flexibility in the event of equipment outage. The Commission states that the "power packages" are gaining wide acceptance among supply utilities for standby purposes and more units are to be installed in the future.

The abundance of QUÉBEC'S water power wealth, much of it within economic transmission distance of existing demand areas, has

tended to limit the applications of thermal power to specific local use. However, the growing emphasis on thermal power in other parts of Canada, is also beginning to be apparent in Québec, where thermal capacity will not only help guarantee an adequate power supply in the face of increasingly heavy demands but also render the almost exclusively hydro-electric base more flexible through integrated operation. The second unit of a large thermal plant went into operation at Tracy near Sorel in 1965 and a second large plant is planned for service in the Gaspé region by 1970.

Most of the energy generated in thermal-electric utility plants in NOVA SCOTIA is derived from coal, with a smaller amount from petroleum fuels. In NEW BRUNSWICK, however, petroleum fuels provide slightly more than half of the thermal-electric energy. PRINCE EDWARD ISLAND depends almost exclusively on thermal sources for its power supply; almost all the province's generating capacity is oil-fuelled. With the exception of several sizeable plants in St. John's and Grand Falls, most of the thermal-electric capacity in NEWFOUNDLAND is made up of relatively small units used to supply power to small, often isolated communities. With the wealth of water power readily available in the province, it is not likely that Newfoundland will experience the need for large thermal stations for some time to come.



Courtenay Bay thermal station, Saint John, New Brunswick.

Until 1965, most of the power requirements of the NORTHWEST TERRITORIES were satisfied from thermal sources. However, commissioning of the Twin Gorges hydro station on the Taltson River in 1965 has altered the balance in favour of hydro. In YUKON TERRITORY, hydro is the main source of supply. Most of the thermal-electric energy in the Territories is generated by small diesel units.

FUELS

Canada has been favoured by nature not only with abundant water power resources, but with exceedingly generous supplies of the fuels from which energy can be produced. Most important of these are coal, petroleum, natural gas and the radio-active ores used to fuel nuclear reactors.

Most of Canada's coal, which is by far the country's most abundant fuel resource, is found in the western provinces, chiefly Alberta. Smaller quantities occur in the Maritime provinces of Nova Scotia and New Brunswick. As with coal, practically all of Canada's oil and natural gas reserves are located in the western provinces, with the greatest concentration in Alberta. The highly populated, industrial areas of southern Ontario and Québec are largely devoid of indigenous fuel supplies and have to rely upon fuels imported from other provinces and from outside Canada. Uranium, the fuel used in Canada's reactors, is available in considerable quantity in both eastern and western Canada.

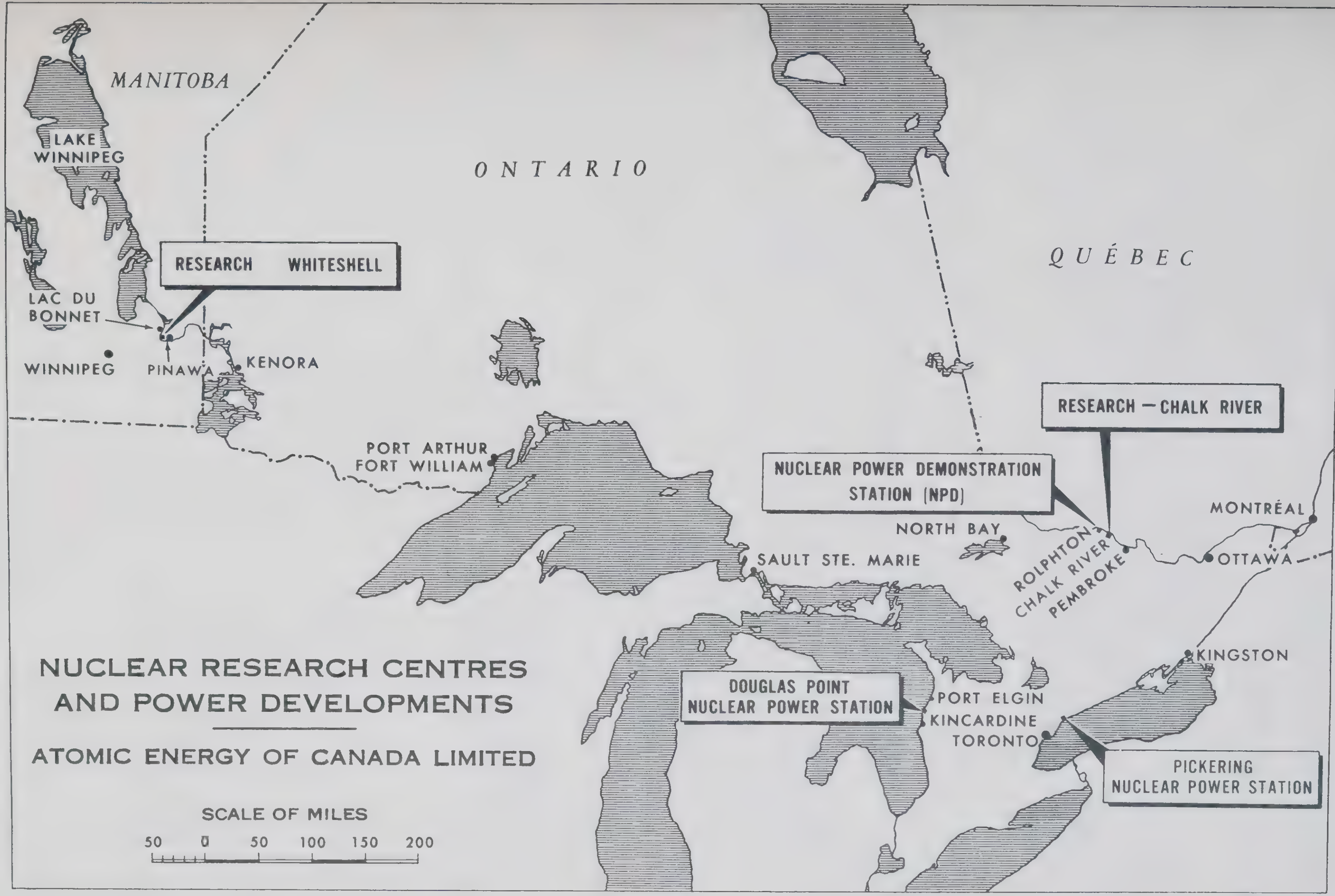
In 1963, the latest year for which statistics are available, 69 per cent of the total energy produced in thermal-electric utility plants was derived from coal. Gas, most of which is natural gas, accounted for 23 per cent and petroleum fuels, 8 per cent.

Ontario burned most of the coal used, with Saskatchewan, Nova Scotia and Alberta accounting for most of the remainder. Almost all of the gas was used in western Canada, principally in Alberta. Petroleum fuels were used in every province in Canada. New Brunswick accounted for the largest quantity of petroleum fuels used, followed by Saskatchewan, Prince Edward Island and Nova Scotia in that order.

Nuclear Thermal Power

Commercial electric power generated from the heat of nuclear reaction became a reality in Canada in 1962 when the 20,000-kw. Nuclear Power Demonstration station at Rolphton, Ontario, fed power for the first time into a distribution system in Ontario. The NPD station is the forerunner in a series of increasingly large nuclear stations that will shoulder more and more of Canada's rapidly growing power loads.

Research into reactor design and the application of nuclear


MANITOBA
ONTARIO
QUÉBEC
LAKE WINNIPEG
RESEARCH WHITESHELL
LAC DU BONNET
WINNIPEG
PINAWA
KENORA
PORT ARTHUR
FORT WILLIAM
RESEARCH — CHALK RIVER
NUCLEAR POWER DEMONSTRATION STATION (NPD)
NORTH BAY
MONTRÉAL
OTTAWA
ROLPHTON
CHALK RIVER
PEMBROKE
SAULT STE. MARIE
KINGSTON
DOUGLAS POINT NUCLEAR POWER STATION
PORT ELGIN
KINCARDINE
TORONTO
PICKERING NUCLEAR POWER STATION
NUCLEAR RESEARCH CENTRES AND POWER DEVELOPMENTS
ATOMIC ENERGY OF CANADA LIMITED
SCALE OF MILES
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energy in the electric power field are among the more important responsiblities of Atomic Energy of Canada Limited, a Government of Canada Crown Company incorporated in 1952.

CANDU REACTOR [1]

AECL has expended great effort on the development of the CANDU reactor, which uses natural uranium as a fuel and heavy water as the moderator. By using heavy water as the moderator, a high energy yield can be obtained from natural uranium and since natural uranium is a low-cost nuclear fuel, the cost of fuel is a minor component in the cost of producing power. Natural uranium has the added attraction of being available in commercial quantities in Canada.

The Canadian nuclear power reactor also offers the simplest of nuclear fuel cycles. Sufficient energy can be extracted from the fuel so that the economics of the system do not require a value to be placed on the spent fuel. There is, therefore, no need to carry out costly chemical processing of the spent fuel unless the worth of the remaining contained fissile material becomes sufficiently high to make chemical processing an economic proposition. The spent fuel is an ideal package for simple underwater storage and no large volume of highly radio-active liquids from a chemical processing plant has to be handled and contained.

NUCLEAR POWER STATIONS

The Nuclear Power Demonstration station, previously mentioned, has been used extensively to demonstrate the ability of the system to operate at a high capacity factor and to determine the nature and predictability of outages. Fuel changes while the system is in operation have become routine and a considerable amount of research into the sources of heavy water losses has been carried out. As a result of this research, losses have been cut considerably and the NPD is demonstrating that a very acceptable heavy water loss rate is attainable.

At Douglas Point on the shore of Lake Huron, the country's first full-scale nuclear power station is under construction. The station, being built with the co-operation of Ontario Hydro, will house a 200,000-kw. CANDU reactor and will produce first power in 1966.

Experience gained in the design and operation of the CANDU reactor has encouraged the development of even larger units and plans have been announced for the construction of the two-unit, 1,080,000-kw. Pickering nuclear station, to be built near Toronto, with in-service dates for the two units scheduled for 1970 and 1971.

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1. Atomic Energy of Canada Limited, Annual Report 1963-64.

NUCLEAR RESEARCH IN CANADA

The principal centre for nuclear research and development in Canada is at AECL's Chalk River Laboratories in Ontario. Complementing the Chalk River Establishment is the Whiteshell Nuclear Research Establishment at Pinawa, Manitoba.

At the former, the NRX research reactor has been in operation since 1947 and the larger NRU research reactor since 1957. At Whiteshell, the new WR-1 reactor was scheduled for operation late in 1965. In these research reactors, reactor fuels, coolants and other materials can be rigorously tested under conditions comparable to or even more severe than those that would be experienced in a nuclear power reactor.

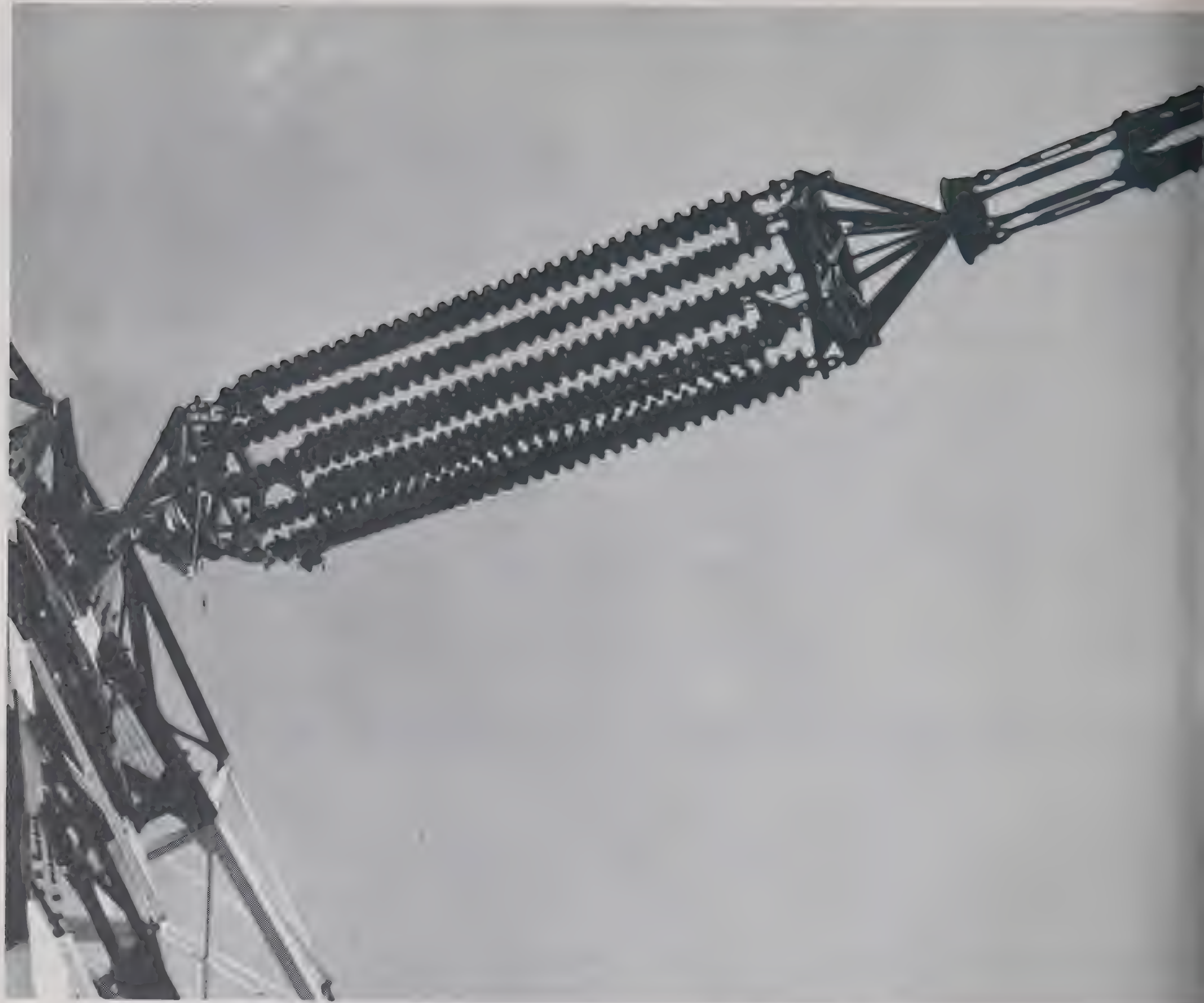
Electric Power Transmission

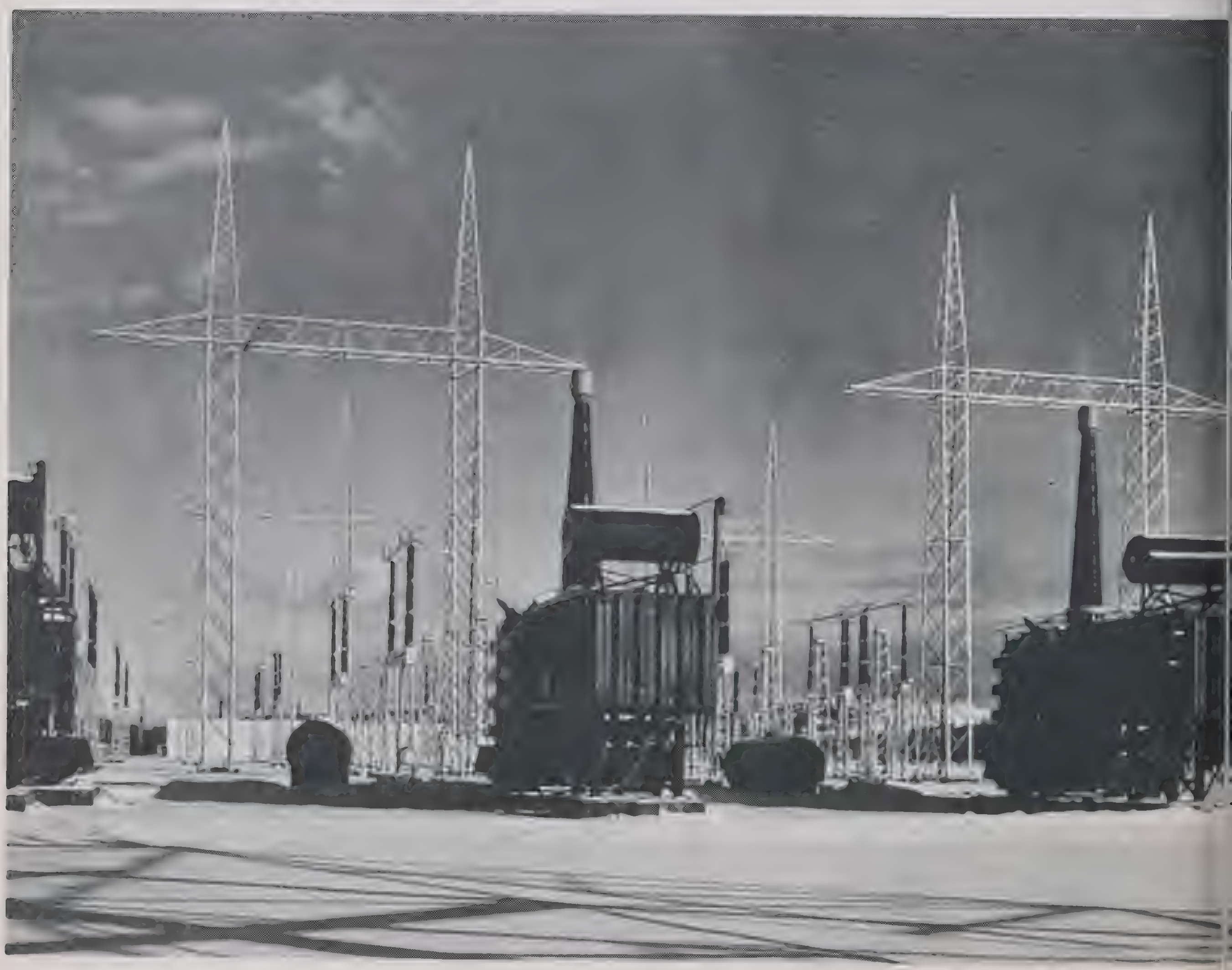
In the early days of the power industry in Canada, power systems were small and far apart and were designed to supply specific local needs. The nature of the loads handled by these systems was not such as to warrant the expense of interconnection between systems. As time went on, however, the loads increased and changed in nature, the systems grew in size and improved techniques reduced transmission costs. The benefits of interconnection to integrate smaller power systems were re-appraised in the light of changing conditions and were found to offer advantages which far outweighed the costs.

The resulting amalgamation of the small systems into larger operating groups has gone on steadily and today most of the power produced in Canada comes from generating stations which are components in the large integrated and often interconnected power systems operated by power utilities and companies in the various provinces.

The integral role of power transmission in the process is obvious. In the days of small, self-contained power systems, it was not necessary to carry power over great distances and low operating voltages were adequate. With the increase in transmission distances from the point of generation to the point of distribution and thence to the user, transmission methods had to be improved and operating voltages increased. Moreover, the growth in power demand was forcing power producers to consider the development of hydro-electric sites previously considered to be outside the economic transmission radius, adding impetus to research in the field of extra-high-voltage (EHV) transmission.

This research has resulted in a successive stepping up of transmission voltages. In 1965, another first in the annals of the electric industry was recorded when a 735-kv. transmission line was energized to carry power southward from the Manicouagan-Outardes hydro complex





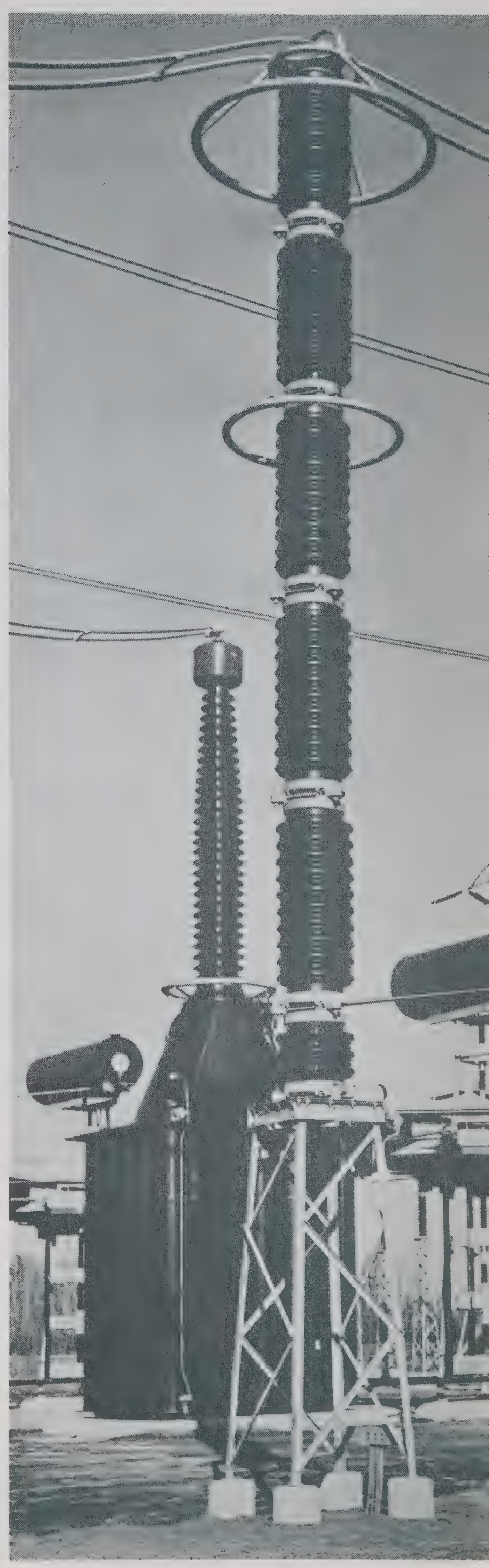
rld's highest a.c. transmission voltage, 735 kilovolts, ed for the first time in Canada in 1965 to transmit from the Manicouagan-Outardes hydro complex in to load centres in the Quebec City and Montreal areas.

p left:
sulator assembly weighing over eight tons.

ottom left:
unt reactors at Manicouagan collector station.

bove:
. Lawrence River crossing near Quebec Bridge.

ght:
ghtning arrester at Lévis substation.

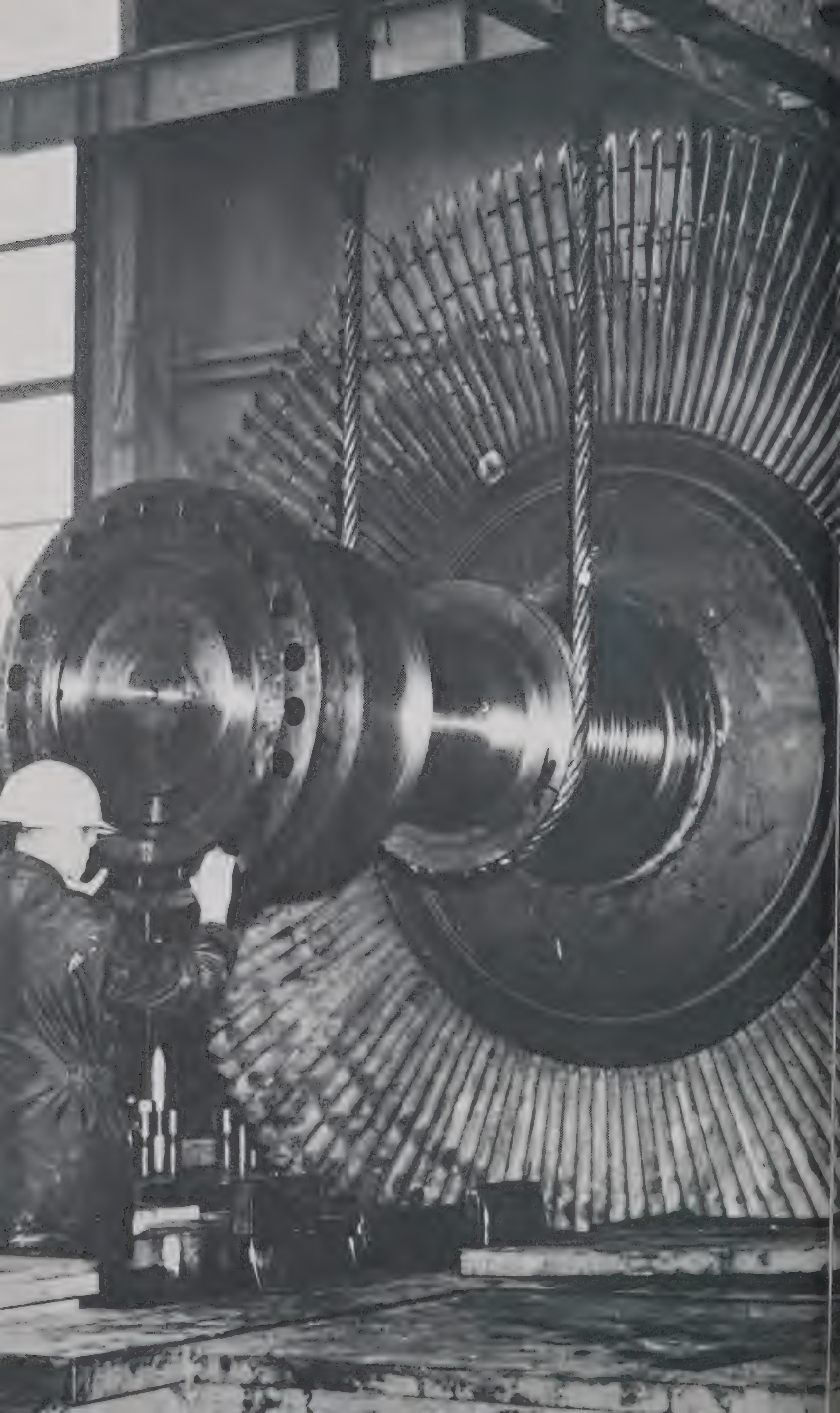


in Québec. This line, which operates at the highest AC voltage in commercial use anywhere in the world, is the forerunner of three such lines, each 365 or 375 miles long, designed to supply load centres in Québec City and Montreal. Elsewhere in Canada, there are in operation or under construction, a number of transmission lines designed for operation at voltages of 500 kv. or more. In British Columbia, two 500-kv. lines connect the British Columbia Hydro and Power Authority system with the Bonneville Power Administration system in the State of Washington. The lines are being operated for the present at 230 kv. Power from the Peace River will be carried to the Lower Mainland of British Columbia via a 574-mile, 500-kv. line, at present under construction. The southern limit of construction of the EHV line from the hydro plants in the James Bay watershed is moving steadily closer to Toronto. When the entire 440-mile line is complete in August 1966, energy will be fed from the Pinard collector station to the Toronto area at 500 kv.

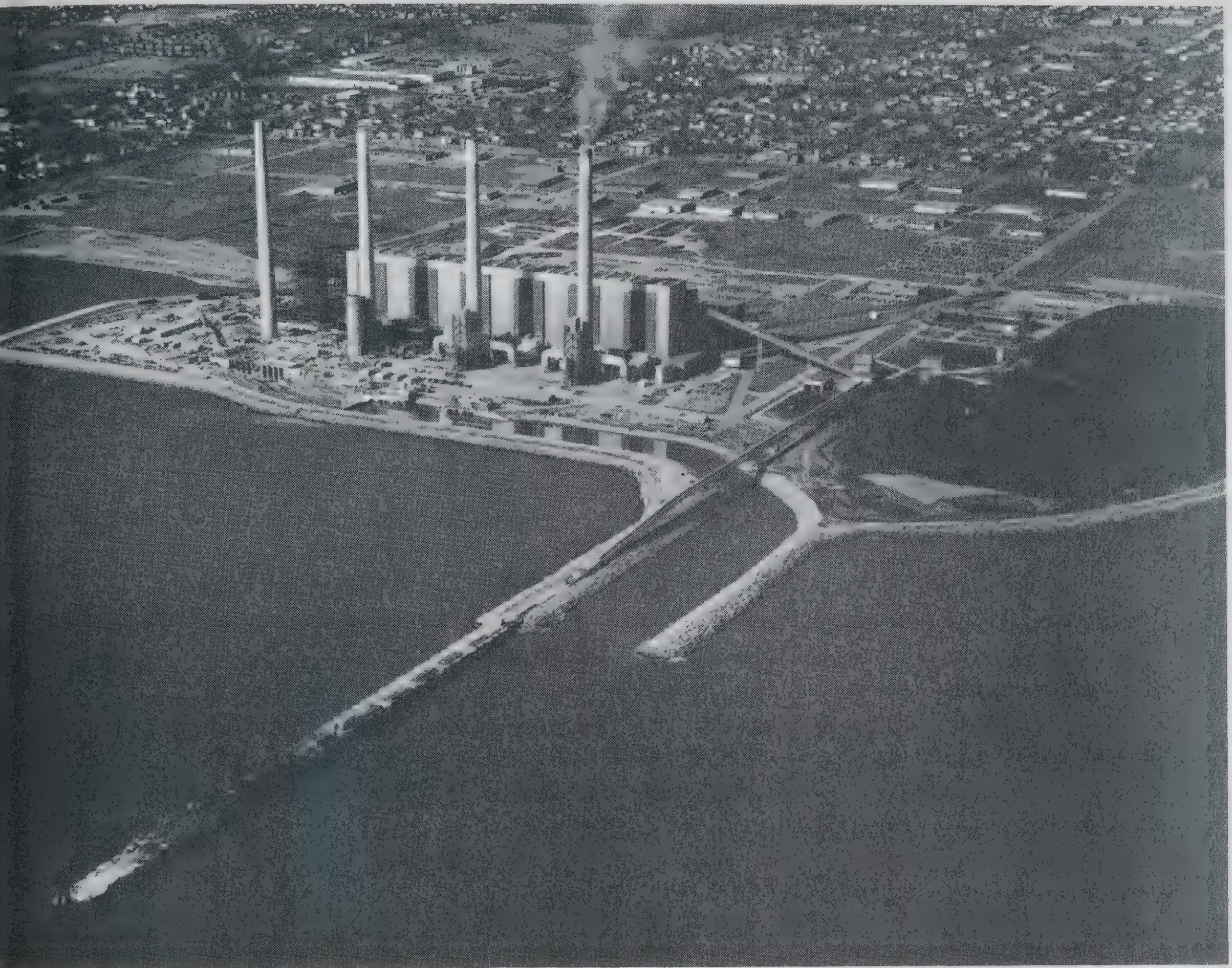
It is obvious that, with the large increase in transmission distances, transmission costs will represent a much higher factor in the total cost of supplying power. The search for economics has led to many improvements not only in the materials used but also in tower erection and cable stringing methods. Guyed aluminum V-shaped or Y-shaped transmission towers are being used increasingly where the terrain is suitable in place of self-supporting towers and erection costs are being lowered by using helicopters to transport tower sections to the site and for tower assembly. The use of helicopters for spraying for bush control on line right-of-way and for line inspection and maintenance is becoming more widespread.

At present, interconnections of from 66 kv. to 230 kv. exist between systems in Alberta and British Columbia; between Saskatchewan, Manitoba and the northwestern Ontario system; the interconnected north-eastern and southern Ontario systems and Québec, and between New Brunswick and Nova Scotia.

There are important international interconnections between British Columbia and the State of Washington; Ontario and the State of Michigan; Ontario and the State of New York; Québec and the State of New York, and between New Brunswick and the State of Maine.



PROGRESS IN DEVELOPMENT - 1965



Construction at Lakeview thermal station near Toronto, Ontario, passes halfway mark in 1965.

General Review

The year 1965 saw Canada's electric power generating capacity increase by the massive total of 2,242,000 kw. Hydro capacity accounted for 1,434,000 kw. and thermal for the remaining 808,000 kw. With the exception of 1959, when nearly 2,500,000 kw. of new capacity went into service, the 1965 increase is the highest ever recorded and almost triples the 1964 total of 754,000 kw. The new capacity that saw initial service in 1965 boosted the nation's total installed generating capacity to 29.4 million kilowatts, 21.8 million kilowatts of which is hydro and the remaining 7.6 million thermal.

On the basis of present estimates, almost 1.8 million kilowatts of new generating capacity will go into service in 1966, 883,000 kw. of this in hydro plants and 875,000 kw. in thermal stations. Including the new capacity scheduled for 1966, Canada's power producers have under construction or have scheduled a total of 16.5 million kilowatts which

will come into service within the next few years. Hydro capacity will account for 9.7 million kilowatts of this total and thermal the remaining 6.8 million. None of these estimates, however, includes any of the vast water power potential that may eventually be developed on the Churchill River in Labrador, the Nelson River in Manitoba or the Columbia River in British Columbia.

HYDRO-ELECTRIC DEVELOPMENTS

Major hydro-electric developments were under construction during 1965 in almost every province in Canada. The largest of these were the Portage Mountain development on the Peace River in British Columbia and the giant Manicouagan-Outardes hydro complex in Québec.

The generating station at Portage Mountain, designed for a capacity of 2,270,000 kw., will house the greatest concentration of power generating facilities in Canada.

In Québec, the construction program on the Manicouagan and Outardes Rivers brought 755,000 kw. of new capacity into operation in 1965. The present 1,000,000 kw. of installed capacity on these two rivers will eventually reach almost 6,000,000 kw.

Construction of the 459,000-kw. Bay d'Espoir development on the Salmon River in Newfoundland and the Mactaquac development on the Saint John River in New Brunswick went ahead on schedule during 1965. There is as yet no indication, however, of when the development of the four million kilowatts of hydro capacity at Churchill Falls on the Churchill (Hamilton) River will proceed.

On the prairies, the Big Bend development on the Brazeau River in Alberta went into operation with 144,000 kw. of generating capacity. Scheduled for 1966 is an additional 175,000 kw. In Manitoba, 330,000 kw. of new capacity went into service at Grand Rapids on the Saskatchewan River. In the Northwest Territories, the single-unit, 18,000-kw. Taltson hydro development was brought into operation. Although very much smaller than most other hydro plants presently under construction in Canada, the Taltson plant nevertheless should prove a great boon to mining development in the Great Slave Lake region.

THERMAL-ELECTRIC DEVELOPMENTS

The 1965 thermal-electric installation of 809,000 kw. was the greatest amount of thermal generating capacity ever to go into service in a single year in Canada. An even larger total – 875,000 kw. of new capacity – is expected to see initial service in 1966. The latter will include 200,000 kw. of nuclear-electric capacity. The consistently high rate of thermal capacity installation over the last few years is an

indication of the growing dependence upon thermally-generated electric energy. The current emphasis on thermal capacity is due in part to recognition of the flexibility of operation offered by integrated power systems using both hydro and thermal equipment. It is due in part also to economic and technical considerations involved in transmitting over long distances the potential output of large undeveloped hydro sites located in northern areas.

CONVENTIONAL THERMAL STATIONS

Largest of the new conventional thermal units installed in 1965 was the 300,000-kw. unit at Lakeview Station near Toronto, Ontario. Lakeview's ultimate capacity of 2,400,000 kw. – double its present capacity – will be reached by 1968.

A single 150,000-kw. unit was installed in the Burrard steam plant near Vancouver, British Columbia and a unit of the same rating at the Tracy steam plant near Sorel, Québec. The present capacity at Burrard is 450,000 kw. and at Tracy, 300,000 kw. In each case, the ultimate capacity will be double the existing capacity.

At Tuft's Cove in Nova Scotia, a 100,000-kw. single-unit thermal plant was placed in service in 1965. The generating capacity at Tuft's Cove may eventually exceed 500,000 kw.

The planned installation of four 500,000-kw. units at the Lambton thermal station, now under construction near Sarnia, Ontario, is evidence of the trend to very large steam units. The four huge units will be brought into service at the rate of one each year from 1968 to 1971 and will be the largest in operation in Canada.

NUCLEAR THERMAL STATIONS

Canada's first commercial nuclear-electric power became available in 1962 when the Nuclear Power Demonstration Station (NPD) at Rolphton, Ontario, went into operation. Three years of successful operation at Rolphton have demonstated the soundness of the design and established confidence in the CANDU reactor.

The first full-scale nuclear-electric power station in Canada will go into service in mid-1966 at Douglas Point on the eastern shore of Lake Huron with a generating capacity of 200,000 kw. Just east of Toronto, on the shore of Lake Ontario, a site is being readied for construction of the huge Pickering Nuclear-Electric Station. The Pickering station, to be equipped initially with two 540,000-kw. units, scheduled for 1970 and 1971, will be the first of many large nuclear-electric stations which can be expected to shoulder more and more of Canada's constantly-growing electric power loads.

ELECTRIC POWER TRANSMISSION

The need to transmit power over increasingly great distances has provided the impetus for extensive research in transmission equipment and techniques. As a result, line voltages of 230 kilovolts (kv.) are now common throughout Canada and within the last few years a number of transmission lines for use at 500 kv. have been erected. A new milestone was passed in 1965 with the coming into service of the first of three 735-kv. AC transmission lines designed to carry power from the Manicouagan-Outardes hydro complex in Québec to load centres in the Montreal area. The line voltage of 735 kv. is reported to be the highest in commercial use anywhere in the world.

The successful transmission of power over long distances has stirred a great deal of interest in the possibility of establishing a national power grid which would interconnect the major systems supplying the provinces. The Government of Canada is co-operating with provincial authorities in carrying out studies to determine the physical and economic possibilities of such a national power grid.

The activities of each company are dealt with individually in the progress report which follows.

Progress in the Provinces

British Columbia

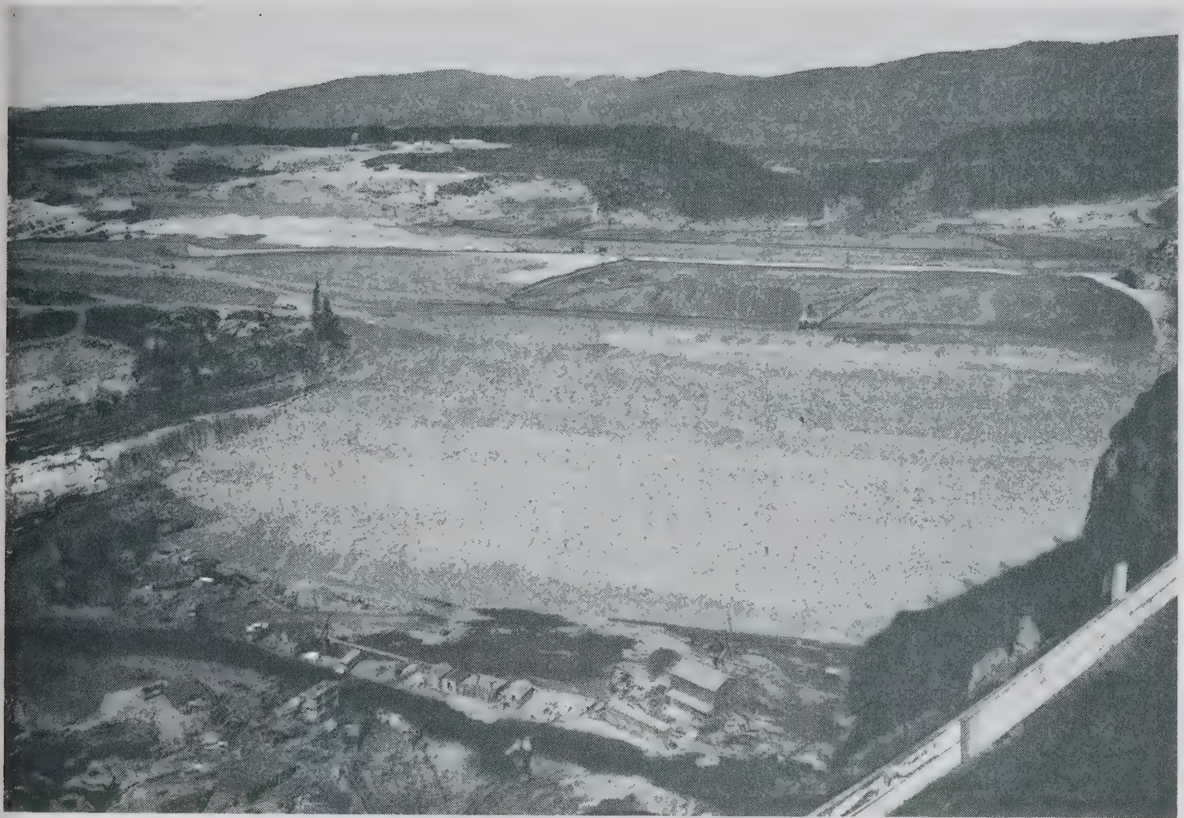
The year 1965 saw the addition of 178,361 kw. of new thermal capacity in British Columbia. New hydro capacity amounted to 4,000 kw. Plans for 1966 involve the installation of 140,560 kw., consisting of 76,000 kw. hydro and 64,560 kw. thermal.

Installations scheduled beyond 1966 will yield over two and one-half million kilowatts of new capacity, almost all of which will be hydro.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

Construction of the giant Portage Mountain hydro plant on the Peace River near Hudson Hope in north central British Columbia is going ahead on schedule. The 2,270,000 kw. for which the Portage Mountain plant is designed represents almost all of the hydro capacity referred to above as being scheduled beyond 1966. The first three of the station's ten 227,000-kw. generating units will be in service by the autumn of 1968.

The dam at Portage Mountain will be 600 feet high with a crest



Initial construction of Portage Mountain Dam fills Peace River Canyon.

length of 6,700 feet, and will contain 60 million cubic yards of material. The reservoir created by the dam will have a surface area of 680 square miles and a volume of 62 million acre-feet. The powerhouse will be underground. During 1965, over 18 million cubic yards were placed to bring the crest of the dam to some 240 feet above bedrock.

Excavation of the power intake channel is complete. The powerhouse access tunnel and ventilation shaft are also complete and work is well advanced on the powerhouse itself. Five of the 310,000-hp. turbines are in course of manufacture and an order for five generators was placed in February 1965.

About 466 miles of the 574-mile, 500-kv. transmission line right-of-way from Peace River to the Lower Mainland of British Columbia has now been cleared and an order placed for steel towers for the 173-mile section of the line between Portage Mountain substation and Prince George, and for the 88-mile section between Kelly Lake substation and Boston Bar. Construction of the 205-mile section between Kelly Lake and Prince George is on schedule and should be completed in 1966.

COLUMBIA RIVER

In September 1964, the Governments of Canada and the United

States exchanged instruments of ratification for the Columbia River Treaty and Protocol, clearing the way for construction of this ambitious international power and flood control project. Under the Treaty, Canada is entitled to one-half the power benefits accruing in the United States from the regulation of 15.5 million acre-feet of water which will be stored behind the Duncan Lake, Arrow and Mica Dams. In addition, Canada will receive payment in the amount of one-half of the estimated flood damage prevented in the United States through operation of the dams for flood control.

The Treaty requires that the Duncan Dam be operational by April 1, 1968, the Arrow Dam by April 1, 1969 and the Mica Dam by April 1, 1973.

The earth-filled Duncan Dam, which will contain about 6,400,000 cubic yards of material, will be 120 feet high and create storage for 1.4 million acre-feet of water. The construction program at Duncan is running ahead of schedule. The two diversion tunnels, with their inlet and outlet structures, will be ready in 1966, freeing the river bed for construction of the dam.

The earth-filled Arrow Dam, 190 feet high with a crest length of about 2,850 feet, will impound 7.1 million acre-feet of water. Construction of a coffer-dam to enclose the navigation lock, spillway gates and low-level releases got under way in March 1965 and placing of the fill has now been completed. The new water supply to Celgar Mills at Castlegar is now in operation and temporary log-loading and transport facilities are being installed to carry logs past the work area during construction.

Mica Dam, highest of the three with a crest at 645 feet above bed rock, will provide 19 million acre-feet of storage in a reservoir 90 miles long. A contract for construction of two 45-foot-diameter diversion tunnels to carry the river past the construction site was awarded in July 1965. The tunnels, about 3,200 feet long, are to be completed by May 1967.

Completion of the storage reservoirs in Canada will facilitate "at-site" development of several million kilowatts of hydro-electric capacity in the Canadian portion of the basin.

In the thermal-electric field, the third 150,000-kw. unit at the Burrard generating station went into operation in 1965, bringing the total installed capacity at Burrard to 450,000 kw. in three units. A fourth 150,000-kw. unit is in course of installation and should be in service in September 1967. The ultimate capacity of this station will be 900,000 kw. in six units.

Generating capacity at eight of the Authority's diesel stations was

boosted in 1965 by a total of 28,361 kw. as follows: Chetwynd 12,000 kw.; Mica 5,175 kw.; Hazelton 3,650 kw.; Smithers 3,000 kw.; Stewart 1,400 kw.; Burns Lake 1,136 kw.; Port Hardy 1,000 kw.; Gold River 1,000 kw.

With completion in 1965 of a 56-mile, 230-kw. transmission line from Kelly Lake to Savona and a 26-mile, 138-kv. line from Savona to Valleyview Substation, the Authority's Southern Interior System is now part of the integrated provincial transmission network.

A second link with the Bonneville Power Administration system at the International Boundary went into service in July 1965. Built for operation eventually at 500 kv., this link is at present being operated at 230 kv.

Major contracts have been awarded for terminal equipment and structures for a DC submarine - cable circuit to link Vancouver Island with the mainland. Target date for completion of the link is 1967.

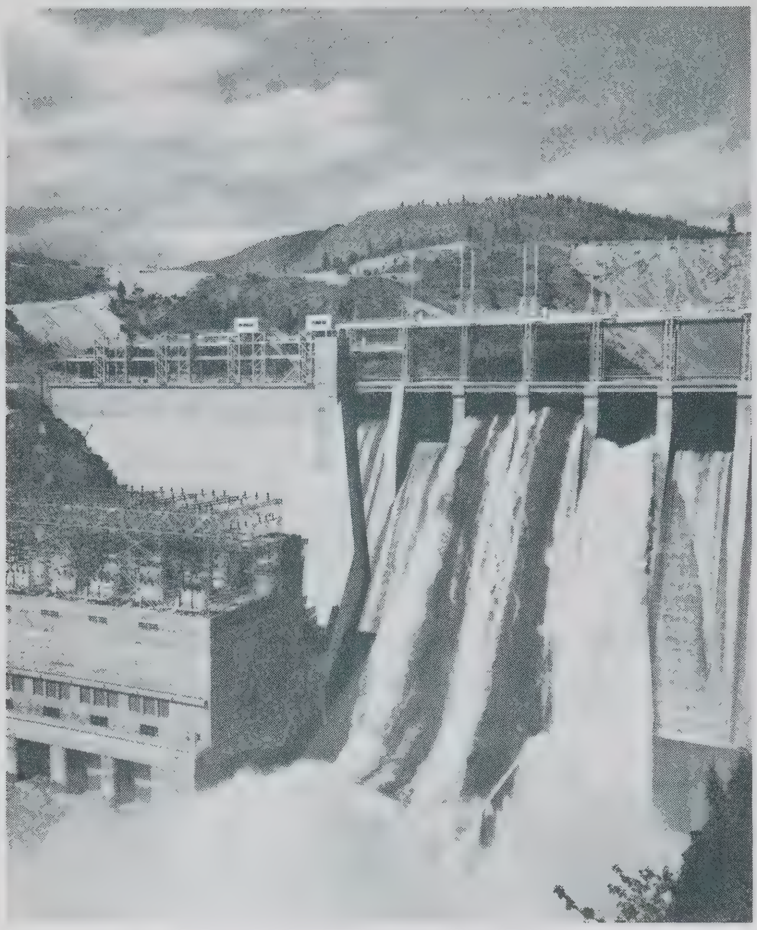
Progress is reported on the 40-mile, 287-kv. line from Kitimat to Terrace and the 80-mile line from Terrace to Prince Rupert. The transmission connection between Kitimat and Prince Rupert is designed to augment locally-generated power supplies in the Prince Rupert area with power from the Aluminum Company of Canada's Kemano hydro plant. Ultimately, the Prince Rupert area and the Skeena and Bulkley Valleys will be supplied with power from the Peace River development by transmission from Prince George. British Columbia Hydro and Power Authority and Aluminum Company of Canada will both derive long-term benefits from the interconnection.

Other additions to the Authority's transmission system during 1965 included the following: 138-kv. lines from Burrard thermal station near Vancouver to Fraser Mills, Vavenby to Avola on the North Thompson River, Savona to the new Highland substation (Nicola Valley copper mines), Kamloops east to Sorrento (conversion from 60 kv.), Smithers - Telkwa and Topley-Houston in the Bulkley Valley west of Prince George (initial operation at 25 kv.) and a 75-mile extension from McEwan to Kennedy to Morfee, north of Prince George; 60-kv. lines from Colebank to Hixon north of Quesnel, Prince George to pulp mills and Cheekye to Squamish pulp mill.

New substations were established during the year at Camosun in the Vancouver area and at Kamloops, Savona, Highland Valley, Chase and Sorrento in the Southern Interior. Over 750 mva. of transformer capacity was installed at new and existing substations during 1965.

CITY OF REVELSTOKE

The City added a second 4,000-kw. unit at the Walter Hardman hydro plant in January 1965, bringing the plants capacity to 8,000 kw. Also added in 1965 were one 5,000-kva. and one 4,000-kva. transformer.



Waneta hydro development on the Pend d'Oreille River, British Columbia.

CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED

Installation of the fourth and final unit at Waneta hydro station on the Pend d'Oreille River commenced in September 1965. The 76,000-kw. unit, scheduled for initial operation in mid-1966, will bring the generating capacity at Waneta to 292,000 kw.

The Company installed two new 25,000-kva., 63-kv. stepdown substations in the Trail area to serve new industrial loads.

COLUMBIA CELLULOSE COMPANY LIMITED

The Company is building a 750-ton-per-day bleached-kraft mill at Watson Island near Prince Rupert. A turbo-generator rated at 34,560 kw. will supply electric power from process steam. The unit, which will be in operation in September 1966, will be installed in the mill powerhouse and no transmission line will be required.

MacMILLAN, BLOEDEL AND POWELL RIVER LIMITED

The Company has on order a 30,000-kw. steam turbo-generator for the Powell River plant. The new unit is due to go into service in November 1966.

Designs are being completed for three miles of 132-kv. trans-

mission line and for a 40,000-kva., 132-kv. to 13.8-kv., substation for the Powell River Division. The equipment is on order and construction will start early in 1966, for completion in September 1966.

ALUMINUM COMPANY OF CANADA, LIMITED

The 1964 issue of "Electric Power in Canada" reported that an eighth 105,600-kw. unit was scheduled for installation at the Kemano hydro station in 1966. Installation of the unit has been deferred and it is now reported that the eighth unit will probably go into service in 1967. Total capacity of the eight units at Kemano will be 812,800 kw.

WEST KOOTENAY POWER AND LIGHT COMPANY LIMITED

The Company is reported to be planning to construct a 246-kv. transmission line to carry power from plants on the Kootenay and Pend d'Oreille Rivers to Kimberley, where Consolidated Mining and Smelting Company, the parent company of West Kootenay Power and Light Co., operates a large industrial complex which includes a fertilizer plant, an iron plant and the largest silver-lead-zinc mine in the world.

Power is carried to Kimberley at present over a 161-kv. line which crosses Kootenay Lake in a single span two miles long. Service was disrupted several years ago when the anchor tower on the east shore of Kootenay Lake was sabotaged. The new line to Kimberley will follow the highway between Salmo and Creston and another span across Kootenay Lake will not be necessary.

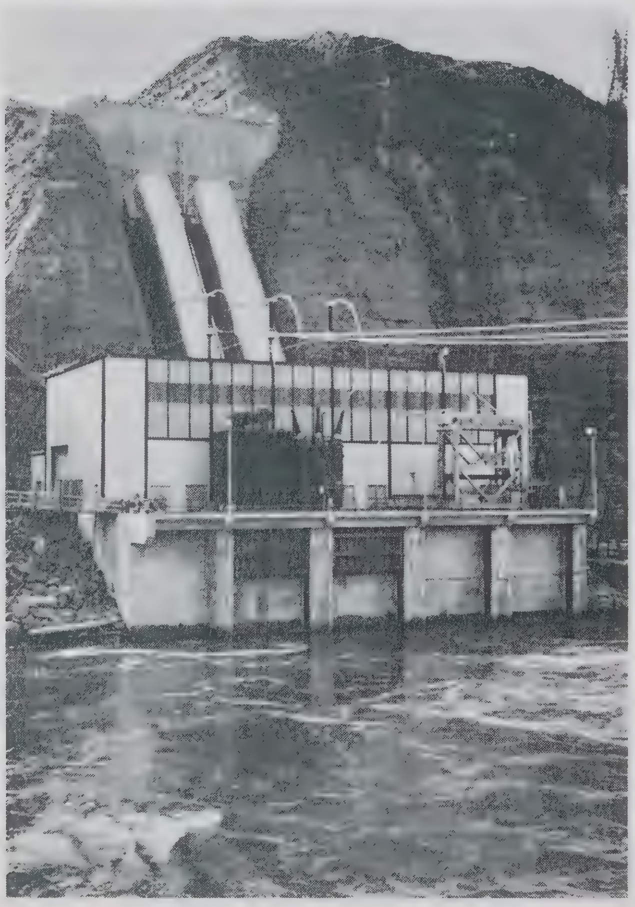
Construction of a high-voltage transmission line from Trail to Penticton began in 1963 and was completed in 1965 in preparation for 170-kv. operation early in 1966. Terminal facilities at Trail and Penticton were scheduled for delivery before the end of 1965.

The Company installed approximately 15 miles of 63-kv. line, most of it in the Kelowna area.

New 63-kv. stepdown substation capacity installed during 1965 was as follows: 10,000 kva. at Kelowna (Richter); 10,000 kva. at Kelowna (Hollywood); 10,000 kva. at Princeton; 6,000 kva. at Penticton; 3,000 kva. at Kaslo; 2,000 kva. at Red Mountain

Alberta

Alberta's total installed electric generating capacity increased by 153,720 kw. in 1965, all of it in hydro developments. Estimates for 1966 point to the installation of 283,720 kw. of new capacity, 184,720 kw. of



Two views of the Big Bend hydro development, under construction on the Brazeau River, Alberta.

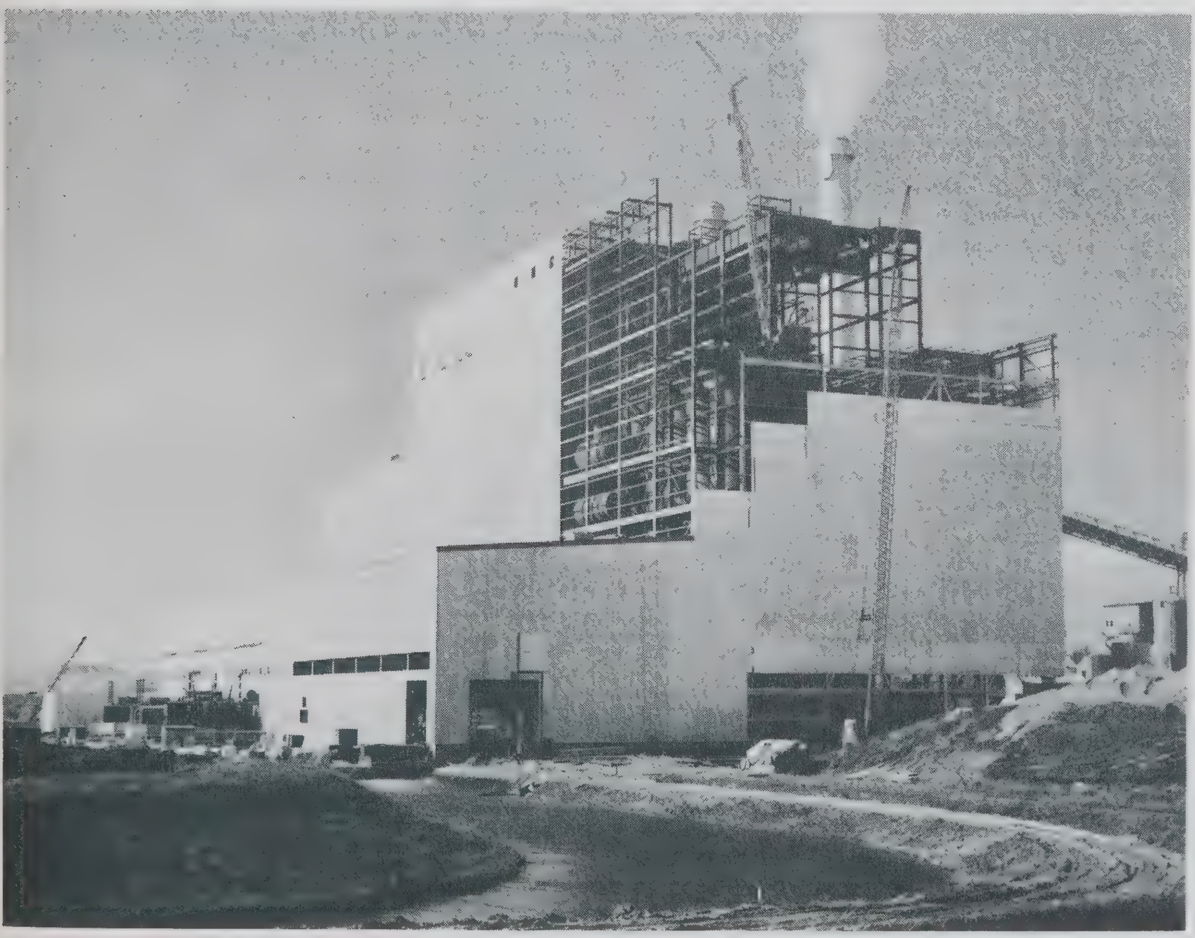
which will be hydro and 99,000 kw. thermal. Scheduled for installation after 1966 is a total of 780,000 kw. of new thermal capacity.

CALGARY POWER LTD.

Alberta's total installed hydro-electric generating capacity was increased by some 50 per cent in 1965 when the first unit at Calgary Power's Big Bend hydro development on the Brazeau River went into service. The unit, consisting of a 144,000-kw. generator driven by a 210,000-hp. turbine, has the highest turbine rating of any unit in service in Canada. The kilowatt rating of the generator is exceeded only by the 148,500 kw. units operating in the Chute des Passes development on the Peribonka River in Québec.

At Big Bend, water is carried from the storage reservoir via a 12-mile canal to the penstocks which convey the water to the turbines. A pumping-generating plant is incorporated in the development at the outlet of the storage reservoir. Under operating conditions, when the reservoir storage level is higher than the water level in the main power

Construction in progress at Wabamun thermal station in Alberta.



canal, the pump-generator units will function as generators to provide additional power; when the reservoir level is lower than the canal level, the units will operate as pumps to raise water to the canal.

At the main powerhouse, installation of a second unit is under way. The second unit – generator 175,000 kw. and turbine 250,000 hp. – is scheduled for the fall of 1966. The main plant is capable of housing four units.

At the pump-generator station, one unit is already installed and the second is in process of installation. The pump-generators are each rated at 9,720 kw.

Work continues on the extension to the Company's Wabamun thermal station. The existing capacity at Wabamun – 282,000 kw. – will be boosted to 582,000 kw. in the fall of 1967 when a 300,000-kw. coal-burning steam unit goes into service.

The Company's transmission network was extended during 1965 by 150 circuit miles of new line.

CANADIAN UTILITIES LIMITED

Capacity of the Company's generating facilities, at present exclusively thermal, remained unchanged in 1965. Boiler and turbines contracts have been awarded, however, for a 150,000-kw. coal-fired steam turbo-generator due to come into operation in June 1969 at the Battle River plant near Forestburg. Earlier plans, now superseded, called for the installation of a 75,000-kw. unit at Battle River.

A 20,000-kw. gas turbine unit will be installed in Simonette for operation in October 1966. Due to the fact that power will be available from Simonette, it will no longer be necessary to move a 30,000-kw. unit from Vermilion to Worsley in 1967 as previously planned.

Although the Company does not at present operate hydro-electric generating facilities, a study of the hydro potential of the Smoky River in the Grande Prairie area has been carried out and eight sites are under consideration for possible development. The capacities that could be installed at the eight sites vary from 60,000 kw. at the confluence of the Smoky and Kekwa Rivers to 620,000 kw. at Mile 283 near Mount Robson.

The Company's transmission line mileage was increased in 1965 by a total of 196 miles as follows: Sturgeon to Grande Prairie, 70 miles of 138-kv. line; Sarah Lake to Swan River, 24 miles of 72-kv. line; Swan River to Mitsue, 62 miles of 72-kv. line; Vermilion to Lloydminster, 40 miles of 72-kv. line. Another 18 miles of 72-kv. line, between Stettler and Nevis, was completed before the end of 1965.

New transformer substations, each rated at 6,000 kva., were installed at Mitsue, Swan River and Nevis.

CITY OF EDMONTON

Scheduled for initial service in May 1966 is a 75,000-kw. gas-fired, steam turbo-generator now being installed at the Edmonton thermal plant. The new unit will bring the generating capacity at the Edmonton plant to 405,000 kw.

The City is reported to have reached a decision to build a new plant consisting of two 165,000-kw. gas-fired units, the first scheduled for service in 1970 and the other in 1973.

CHEMCELL (1963) LIMITED

The Company expects to put a new 4,000-kw. unit into service in October 1966 at its Clover Bar thermal station at Edmonton. The existing capacity at Clover Bar is 18,000 kw.

Saskatchewan

Saskatchewan's electric power generating capacity remained unchanged in 1965. Current construction, however, will bring 43,000 kw. of new hydro capacity and 15,000 kw. of new thermal capacity into

Boundary Dam thermal station at Estevan, Saskatchewan.

operation in 1966. Present estimates of capacity installations subsequent to 1966 indicate a total of 229,600 kw. hydro and 300,000 kw. thermal.

SASKATCHEWAN POWER CORPORATION

Squaw Rapids hydro plant on the Saskatchewan River will have unit no. 7 in operation in October 1966 and unit no. 8 in April 1967. Installation of the two units, each rated at 43,000 kw., will boost the station capacity to 287,000 kw.

Construction of the South Saskatchewan River Project near Outlook continues. The dam and reservoir at the project are being built by the Prairie Farm Rehabilitation Administration for irrigation purposes, but hydro-electric generating facilities will be incorporated. Saskatchewan Power Corporation will install these facilities at what is known as the Coteau Creek site. First power is expected late in 1968 when two 62,200-kw. generators go into service. A third unit of the same size will be added in 1969. Three of the five diversion tunnels, used for de-watering purposes at the dam, have been lined with steel and will serve as penstocks to carry water from the reservoir to the power plant.

Because of an exceptionally high rate of load growth, the Corporation has been obliged to revise its system forecast and studies have been carried out to determine the most economical means of supplementing the power which will become available from Squaw Rapids and Coteau Creek over the next few years.

Site investigations for a hydro peaking plant were carried out during the year at Nipawin on the Saskatchewan River.

A contract has been awarded for a 15,000-kw. gas-fired unit for Swift Current, scheduled for initial operation in the fall of 1966. The Corporation has at present 14,550 kw. of thermal capacity at Swift Current. The addition of one or two more 15,000-kw. units for operation in the autumn of 1967 is under consideration.

Contracts for two 150,000-kw. steam turbines for the Boundary Dam thermal station at Estevan have been awarded. The units, scheduled for commissioning in 1969 and 1971 respectively, will be fired by lignite coal from the Estevan coal fields.

During 1965, transmission lines completed or under construction totalled 177 miles at 138 kv. and 80 miles at 72 kv. The 138-kv. lines are as follows: Coteau Creek to Pasqua, 88 miles; Coteau Creek to Saskatoon, 52 miles; Swift Current to Bone Creek, 37 miles. The line from Swift Current to Bone Creek is operating at present at 72 kv.

The construction of eight new transformer substations and the expansion of five others led to a total capacity increase of 44,000 kva.

Manitoba

During 1965, Manitoba increased its total electric generating capacity by 330,000 kw., all of it hydro. The next scheduled increase in hydro capacity will be 110,000 kw. in 1968.

There are at present no indications of significant thermal additions.

MANITOBA HYDRO

By the end of 1965, three generating units were in service at the Grand Rapids hydro station on the Saskatchewan River. The units consist of 110,000-kw. generators driven by 150,000-hp. turbines.

The turbine for a fourth unit has been ordered and specifications for the generator prepared. Commissioning of the fourth unit, scheduled for August 1968, will complete the planned development of the Grand Rapids site.

Manitoba Hydro's extensive program of system interconnection continued throughout 1965. Energy from Grand Rapids is now flowing south to Winnipeg via two 230-kv. transmission lines. The Rosser substation, which is the terminal point near Winnipeg for the 230-kv. lines, was completed in 1964. At Ashern substation an intermediate point between Grand Rapids and Rosser, facilities for switching between the two 230-kv. lines are incorporated. Ashern is also a switching point for the 230-kv. line to Vermilion, near Dauphin, which was energized late in 1965.

The increased demand for power at Thompson and at associated mining developments has made it necessary to provide a 230-kv. transmission link with the southern system via Grand Rapids. The northern stage of the line from Thompson to Soab Lake initially will carry Nelson River power to new mining developments being established at Soab Lake and Birchtree. This link, involving 47 miles of 230-kv. transmission line, is scheduled for operation in November 1966. The southern stage from Grand Rapids is being pushed northwestward some 161 miles to Soab Lake and is scheduled for operation in November 1967. Completion of the two stages will increase the power available to the region and provide an alternate source of power.

An additional line from Grand Rapids generating station to the southern system will be necessary to maintain stability when the fourth unit at Grand Rapids goes into operation. The additional line, which will operate at 230 kv., will be routed from Grand Rapids west to the Overflowing River and south through Minitonas to Dauphin-Vermilion, a total distance of 246 miles. The scheduled in-service date is August 1968.

In addition to the 230-kv. lines already referred to, Manitoba Hydro during 1965 built a total of 68 miles of transmission line with voltages varying between 66 kv. and 115 kv. and were building an additional 60 miles of line.

Construction of new transformer substations and additions to existing stations boosted transformer capacity in the Manitoba Hydro system by 80,800 kva.

Investigation of the power potential of the Nelson River continued in 1965. Seismic surveys were carried out at several locations on the main Nelson River channel and sub-surface investigations and related surveys were completed on the Churchill River diversion route via the Rat-Burntwood Rivers system. Aerial reconnaissance was carried out along the Nelson and Burntwood Rivers.

As a result of its investigations, a federal-provincial board in an interim report dated December 1965 recommended immediate consideration of the first stage of development on the lower Nelson River. On February 15, 1966, the Prime Minister announced in the House of Commons that the federal government had agreed in principle to participate with Manitoba in undertaking this development. The initial stage will include construction of a power site at Kettle Rapids and the installation of some 855,000 kw. of generating capacity; the diversion of flow of the Churchill River into the Nelson River system near Thompson, Manitoba; regulatory works at the outlet of Lake Winnipeg to control the level of that lake and outflow from it, and high-voltage transmission lines from the Kettle Rapids site southwest to Winnipeg. Because the announcement pertaining to Nelson River development was received after the end of 1965, the total of 855,000 kw. proposed for installation at Kettle Rapids is not reflected in the total given elsewhere in this report for generating capacity under construction or scheduled to go into service within the next few years.

The federal government's role in Nelson River development will consist of the construction, financing and ownership of the main high-voltage transmission lines; also included are branch lines which may be built to the international and provincial boundaries should markets develop.

Although ultimate development of the Nelson River can only be achieved in successive steps, ultimate development will be of a magnitude of 5,000,000 kw.

Ontario

Ontario's already substantial total of electric power generating capacity was increased during 1965 by 491,840 kw. of new capacity.

Thermal generating capacity accounted for 362,640 kw. and hydro for 129,200 kw. Forecasts for 1966 indicate that 532,640 kw. of new thermal capacity and 125,400 kw. of new hydro capacity will go into service.

The growing trend to thermal installation in Ontario is evident in the fact that the new capacity scheduled for installation subsequent to 1966 includes almost 4.0 million kilowatts thermal compared to slightly less than 360,000 kw. hydro.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

During 1965, Ontario Hydro's generation development program involved construction work on three hydro stations, four conventional thermal stations and two nuclear-electric plants. Extensions to two existing hydro stations are planned and investigation of a number of hydro power sites is continuing.

The hydro stations which were under construction during 1965 are the Harmon and Kipling stations on the Mattagami River and the Mountain Chute station on the Madawaska River. The conventional thermal plants involved in the 1965 program are the Lakeview and Lambton coal-fired stations near Toronto and Sarnia respectively, supplemented by the much smaller oil-fired combustion turbine installations at the A.W. Manby station in Toronto and the Sarnia-Scott station in Sarnia; the nuclear-electric stations are the Douglas Point station on the shore of Lake Huron and the Pickering station near Toronto.

HYDRO-ELECTRIC DEVELOPMENTS

The Harmon hydro development on the Mattagami River began initial operation in 1965. The power dam at the Harmon development, about 55 miles north of Kapuskasing, comprises a four-unit headworks, two-unit powerhouse and associated structures. The turbines for the two units are each rated at 94,000 hp. and the generators at 64,600 kw. In-service dates were May and July 1965.

By the end of 1965, the concrete structures at the Kipling station were nearly complete and the installation of the two scheduled units well under way. Both units are expected to be ready for service by the summer of 1966.

Kipling Generating Station, about three miles downstream from Harmon Generating Station, will be the last project to be brought into service in the Commission's current program for the development of the Abitibi and Mattagami Rivers, both of which are tributaries of the Moose River flowing into James Bay. Operating plants included in the program are the Harmon Generating Station, Little Long Generating Station about nine miles upstream from Harmon, and Otter Rapids Generating Station on the Abitibi River. All four stations will be super-

Harmon hydro station on the Mattagami River in Ontario came into service in 1965.

visory-controlled from Pinard Transformer Station at the northern end of the new EHV transmission system which carries power to southern Ontario. There is provision in the headgate structures for eventually doubling the number of units at all four stations.

Flow in the Mattagami River is being augmented by water diverted from the Opasatika River via an excavated canal about 6,200 feet long. The diverted water is fed into a series of tributaries flowing into the Mattagami River at a point about ten miles upstream from Little Long Generating Station. The energy output of the Little Long, Harmon and Kipling stations will be increased as a result of the additional flow in the Mattagami River. The control dam on the Opasatika River and the diversion canal went into operation in the fall of 1965.

The Mountain Chute hydro development on the Madawaska River about 22 miles southwest of Renfrew is scheduled to go into service in the fall of 1967 with two units. The turbines for the new units are rated at 112,000 hp. under a head of 150 feet, and the generators at 69,750 kw. Construction at Mountain Chute began in the summer of 1964. By the end of 1965, excavation work was nearly complete and placing of concrete for the main dam and clearing of about 5,500 acres of the 8,500-acre headpond were well under way. Orders have been placed for the turbines and generators.

As part of the program to provide new generating capacity to

meet Ontario's future power demands, the Commission will install additional units at Barrett Chute and Stewartville Generating Stations, both of which went into service during the 1940's on the Madawaska River below the Mountain Chute site. At Barrett Chute, two 60,000-kw. units will be installed to bring the station's total capacity to 160,800 kw. The units are scheduled for initial operation in the summer and autumn of 1968. At Stewartville, the expansion program involves the addition of two 50,000-kw. units for operation in the late summer of 1969. The present capacity at Stewartville is 61,200 kw.

The installation of additional units at Barrett Chute and Stewartville will bring the total capacities of these stations closely in line with the projected capacity at Mountain Chute. All three stations are to be operated as peaking plants and the in-step operation made possible by their almost equal capacities and heads will minimize the water spillages and water level fluctutations generally inherent in peaking operation on a multi-plant river.

Three power-operated sluice gates are to be installed at Calabogie Generating Station on the Madawaska River, just downstream from Barrett Chute, to control the flow in the river and minimize water-level fluctuations in Calabogie Lake. The sluice gates at Calabogie and the generating units at the other three Madawaska River stations will be supervisory - controlled from a remote point, possibly Chenaux Generating Station on the Ottawa River.

Studies are being carried out to determine the feasibility of further development of the hydro potential of the Montreal and Mississagi Rivers. First projects to be undertaken will probably be the development of the Lower Notch site and the redevelopment of the Upper Notch site, both on the Montreal River.

Barrett Chute hydro station on the Madawaska River and outline depicting planned extension.

CHIPPAWA POWER CANAL - NIAGARA RIVER

Ontario Hydro's Sir Adam Beck Generating Stations near Queenston are powered by Niagara River waters diverted around the falls and rapids via the Chippawa Power Canal and another larger tunnel and canal designated No. 2 canal. However, flows of the Niagara River have been far below normal for several years and diversions permitted for power generation have been greatly reduced, making it feasible to close the Chippawa Power Canal for improvement during the open water months of 1964 and 1965.

The project to rehabilitate and enlarge the 44-year-old Chippawa Canal was begun early in 1964 and was completed in October 1965, increasing the carrying capacity by about 40 per cent, to some 22,500 cfs. Because of the increased capacity, water that under conditions of normal Niagara River flow would be used at the Ontario Power and Toronto Power Generating Stations can now be used at the higher-head, more efficient Sir Adam Beck Generating Stations.

LAKE ERIE - NIAGARA ICE BOOM

To facilitate the formation and retention of a stable ice cover on Lake Erie at the entrance to the Niagara River and thereby reduce the frequency and extent of lake ice movements down the river with their adverse effects on station operations, Ontario Hydro and the Power Authority of the State of New York placed an ice-boom in the lake across the entrance to the Niagara River late in 1964. The ice-boom, installed under an Order of Approval issued by the International Joint Commission, is 10,000 feet long and consists of 22 spans of 30-foot Douglas fir timbers attached at each and to a 2-inch cable held in place by other cables anchored to the lake bed at the span junctions. The boom was removed in March 1965.

During the winter of 1964-65, the boom was effective in reducing ice movements to the extent that river flows and diversions at power station intakes were increased. The Order of Approval was extended to include the 1965-66 ice season and the boom was re-installed in December 1965 and removed in March 1966. The responsible power agencies hope to continue this pattern of installation and removal.

THERMAL-ELECTRIC DEVELOPMENTS

At Lakeview Generating Station on the shore of Lake Ontario just west of Metropolitan Toronto, installation of the fourth 300,000-kw. unit was completed in May 1965. The ultimate capacity at Lakeview will be 2,400,000 kw. in eight units, the eighth unit being scheduled for service in 1968.

Construction work at the site of the Lambton Generating Station

went ahead during 1965. The Lambton station, on the St. Clair River about 14 miles south of Sarnia, will house four 500,000-kw. units, one to come into service each year from 1968 to 1971. By the end of 1965, contracts had been awarded for the main components of all four units and for the supply and erection of powerhouse structural steel.

The Commission has decided to install a number of combustion turbine generators in southern Ontario to serve as standby units and to contribute to the provision of an adequate margin of reserve capacity at times of peak load, particularly during the present period of rapid load growth. Combustion turbine generators can be placed in service with a much shorter lead time than the larger conventional thermal-electric or hydro-electric units. Six units were purchased in 1965, four with a rated capacity of 16,320 kw. per unit for installation at the A. W. Manby Service Centre in western Metropolitan Toronto and two rated at 15,000 kw. per unit for installation at the Sarnia-Scott Transformer Station in Sarnia. The two units at Sarnia-Scott Transformer Station and two of the units at the A. W. Manby Service Centre went into operation in December 1965. Installation of the other two units at the Service Centre will be completed in 1966.

NUCLEAR-ELECTRIC STATIONS

At Douglas Point Nuclear Power Station on the shore of Lake Huron between Kincardine and Port Elgin, installation and testing of the CANDU reactor were well under way at the end of 1965. The 200,000-kw. unit is expected to be ready to deliver power to Ontario Hydro's East System in the late summer of 1966. The Douglas Point Station is a co-operative enterprise of Ontario Hydro and Atomic Energy of Canada Limited. The Commission is building the station as prime contractor for AECL and will purchase the power generated. When the required operating conditions have been satisfactorily met, the Commission will purchase the station.

Site preparation for a very large nuclear-electric station to be built on the shore of Lake Ontario just east of Metropolitan Toronto is now well under way. To be known as Pickering Generating Station, the plant is designed for two 540,000-kw. units, one scheduled for initial operation in 1970 and the other in 1971. The site is suitable for a larger station, however, and further units may be installed later.

During 1965, contracts were awarded for the turbine-generators, steam boilers, primary coolant pumps, the supply of piles and driving of piles for the reactor building. Erection of the reactor buildings is expected to begin in the spring of 1966.

Pickering Generating Station is being financed jointly by Ontario Hydro and the Governments of Ontario and Canada. It is being built and designed by Ontario Hydro with AECL co-operating in the design of the components of the units associated with the nuclear reactors. The

reactors will be of the CANDU type similar to the one now being readied for operation at Douglas Point. The CANDU reactor uses natural uranium as a fuel and heavy water as a moderator and coolant.

ELECTRIC POWER TRANSMISSION

A 174-mile section of the EHV transmission line which will carry power from the developments on the Abitibi and Mattagami Rivers to Toronto went into service in June 1965 at 230 kv. The new section connects Hanmer Transformer Station near Sudbury with Essa Transformer Station near Barrie. The northern section of the line, between Pinard Transformer Station, which is near the power developments, and Hanmer Transformer Station, has been in operation since October 1963 at 230 kv. Work on the last 35 miles of the line, between Essa Transformer Station and Kleinburg Transformer Station just northwest of Metropolitan Toronto, will be completed in the spring of 1966. With completion of the southern section, the entire 437 miles of line between its northern terminal and Toronto will be operated at 500 kv.

A second 230-kv. circuit went into operation on the 34-mile line from Little Long and Harmon Generating Stations to Pinard Transformer Station. The second circuit will incorporate the newly-commissioned Harmon Generating Station into the East System. A three-mile, single-circuit extension of this line is to be completed by the summer of 1966 when the Kipling Generating Station comes into service.

A 53-mile, single-circuit, 115-kv. line between the Great Lakes Power Corporation's Hollingsworth Falls Generating Station and the Commission's new distributing station at Chapleau Township was completed in September. Power supplied to the Township over the line is purchased by the Commission from the Great Lakes Power Corporation.

The total expansion in the Commission's transmission network in 1965 was 324 circuit miles to bring the total circuit mileage to about 19,150.

Expansion of the Commission's transformation facilities during 1965 involved the completion of two new transformer stations and major changes at a number of stations already in service in eastern, central and southwestern Ontario. The two new stations completed in 1965 are the South March Transformer Station near Ottawa and the Toronto-Bermondsey Transformer Station in eastern Metropolitan Toronto.

Work on the 500-230-kv. transformers for Pinard, Hanmer and Kleinburg Transformer Stations continued at the manufacturers' plants. The three stations are expected to be ready in time to allow the EHV line to be converted to 500-kv. operation in the spring of 1966.

NORTHERN CANADA POWER COMMISSION

The Commission expects to add 500 kw. in 1966 to the thermal plant which it operates at Moose Factory, Ontario. The existing capacity of the plant is 850 kw.

Québec

Québec's extensive program of power plant construction added 905,000 kw. of new capacity to the province's already considerable total of almost 10 million kilowatts. The new capacity for 1965 consisted of 755,000 kw. hydro and 150,000 kw. thermal. A total of 451,920 kw. of new capacity, all hydro, is scheduled for 1966.

On the basis of present scheduling, a total of over five and one-quarter million kilowatts of new capacity, almost all of it hydro, should come into service during the years 1967 - 1974.

QUEBEC HYDRO-ELECTRIC COMMISSION

One of North America's most spectacular engineering projects, the harnessing of the power potential of the Manicouagan and Outardes Rivers, went ahead on schedule during 1965. The project involves the

Control room at Manicouagan collector station.

construction of seven new hydro plants on the two rivers and the installation of additional capacity at an existing station. The total amount of new generating capacity to be made available by the Manicouagan-Outardes project will be in excess of five and one-half million kilowatts.

Manic 2, eleven miles from the mouth of the Manicouagan River, went into operation in 1965 with 635,000 kw. of generating capacity in five units. The turbines at Manic 2 are each rated at 170,000 hp. Three more units will complete the development of Manic 2, two scheduled for 1966 and the last unit for 1967.

The next plant to produce power on the Manicouagan will be Manic 1, due to come into service in 1966 with two units. The generators will be rated at 61,660 kw. and the turbines at 80,000 hp. Manic 1 is designed for three units and development will be complete in 1967.

Largest development in the Manicouagan-Outardes hydro complex will be Manic 5, construction of which was well advanced by the end of 1965. When it is completed, the buttressed, multi-arch dam at Manic 5 will be over 4,000 feet long and 703 feet high at the highest point above bedrock. It will be one of the highest and most massive dams of its kind in the world. The total generating capacity for which Manic 5 is designed is 1,344,000 kw. in eight units. The turbines will be rated at 225,000 hp. per unit. First power from Manic 5 is expected in 1970 and completion of the development in 1972.

Last of the new Manicouagan plants to come into service in the current program will be Manic 3, scheduled for initial service in 1972. The total generator capacity at Manic 3 will be 1,120,000 kw. and the total turbine capacity 1,505,000 hp. All seven units at Manic 3 are expected to be in operation in 1974.

On the Outardes River, construction of the Outardes 4 and Outardes 3 plants is well under way. Power at Outardes 4 will be generated by four 158,000-kw. generators driven by turbines rated at 216,000 hp. The first three units will be in service in 1968 and the fourth in 1969. The dam at Outardes 4 will create a reservoir with more than 250 square miles of water surface area.

The underground powerhouse planned for Outardes 3 will house four units consisting of 189,000-kw. generators and 258,500-hp. turbines. Three of the units are scheduled for service in 1968 and the fourth in 1969.

The Outardes 2 plant, which is adjacent to the existing 50,000-kw. Outardes Falls station, is scheduled for service in 1968. The new plant is designed for a total capacity of 447,000 kw. in three units.

Elsewhere in the province, Québec Hydro is developing two sites on the Quinze Rapids reach of the Upper Ottawa River to help supply the power needs of the rapidly-developing northwestern region of the

province. The sites are at Rapides-des-Iles and First Falls. At Rapides-des-Iles, the plant is designed for four units consisting of 37,300-kw. generators and 50,000-hp. turbines. Two units will be in operation in 1966 and the third in 1967. Installation of the fourth unit will depend upon the magnitude of local power demands, Rapides-des-Iles will eventually be operated by remote control. The total designed generator installation for First Falls on the Upper Ottawa River is 112,000 kw. in four units. The turbines will be rated at 40,000 hp. each. The first three units will go into service at the rate of one a year from 1968 to 1970. The fourth unit has not been scheduled.

Québec's enormous water power resources continue to provide almost all the electric energy needed to take care of the province's requirements. Despite Québec's almost exclusive dependence upon hydro power, however, the greater flexibility offered by integrated hydro-thermal operation is leading to a growing interest in the provision of thermal capacity.

The first large thermal station in Québec was commissioned in 1964 at Tracy near Sorel on the south bank of the St. Lawrence River about 45 miles from Montreal. First power from Tracy was generated by a 150,000-kw. oil-fired, steam unit. The station capacity was increased in 1965 to 300,000 kw. with the addition of a second unit. Two more 150,000-kw. units are scheduled for 1967. Until 1968, the Tracy plant will supply peak power during construction of the Manicouagan-Outardes hydro plants. From 1968-1972, during the last stages of the impounding of the Manic 5 reservoir and before the Manicouagan-Outardes development reaches full power, Tracy will operate at full capacity supplying base load. After 1972, Tracy will be operated as a stand-by plant.

A new steam plant is being built to supply power to the Gaspé region. To be equipped with two 150,000-kw. generators, the plant will come into operation in 1970.

The year 1965 is a milestone in the history of electric power transmission in Canada. Extra-high-voltage transmission is not new in this country, but 1965 marks the first time that power has been carried over a transmission line in Canada at 735 kv., the highest AC voltage in commercial use anywhere in the world.

The very considerable distances over which power from the Manicouagan-Outardes plants must be carried to supply the centres of industry and population on both shores of the St. Lawrence River between Québec and Montreal and the magnitude of the output from the plants led to the selection of 735 kv. as the line voltage which would provide the most economic transmission.

Power from the Manicouagan-Outardes plants will be fed to two collector stations, Micoua and Manicouagan, at 315 kv. From the collector stations, the power will be transmitted to load centres in the

Québec - Montreal area over three 735-kv. lines. Two of these lines will follow the north shore of the St. Lawrence River from the Manicouagan collector station to the Isle of Orleans, where they will cross the river to Levis and thence along the south shore to Boucherville substation near Montreal, a distance of 365 miles. One of these lines went into service in September 1965 when first power from Manic 2 became available. The second line will be completed to Levis in 1966 and to Boucherville in 1968.

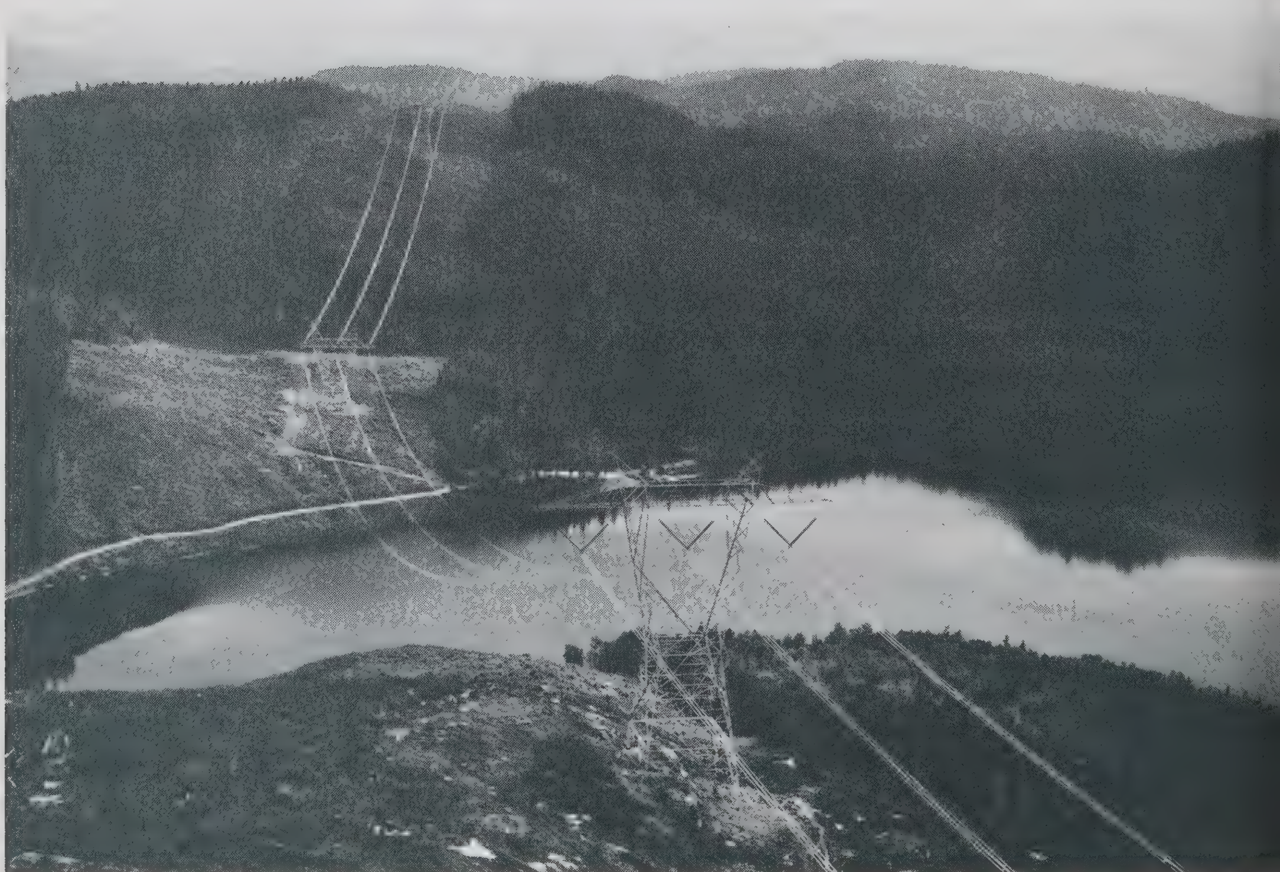
The third line will be built entirely on the north shore from the Micoua collector station to Montreal, a distance of 375 miles. The first section, from Micoua to the Laurentides substation near Québec will be in service in 1970 and the second section, between the Laurentides substation and the Duvernay substation in Montreal will be in operation in 1971.

MANICOUAGAN POWER COMPANY

The Company installed two additional units in 1965 at its McCormick hydro plant on the Manicouagan River. The generators are each rated at 60,000 kw. and the turbines at 80,000 hp. Addition of the new units brings the total installed capacity at McCormick to 311,250 kw.

The McCormick plant will be integrated with Québec Hydro's

Outardes River crossing, Quebec.



Manic 1 project, now under construction, and with the Manicouagan-Outardes project.

CITY OF SHERBROOKE

In 1965, a 400-hp. turbine driving a 330-kw. generator was installed at the Drummond hydro plant, bringing the total plant generating capacity to 910 kw. in two units.

DEPARTMENT OF NATURAL RESOURCES - PROVINCE OF QUÉBEC

Throughout 1965, the Department regulated flows in the North, Chicoutimi, Aux Sables, Du Loup, St. François and Lièvre Rivers by the operation of dams controlling 16 major storage reservoirs. One of the purposes for which these reservoir are operated is the provision of storage for hydro-electric developments.

On July 1, 1965, responsibility for operating and maintaining flow-regulation dams and reservoirs on the Gatineau, St. Maurice, St. Anne and Métis River was transferred to Québec Hydro.

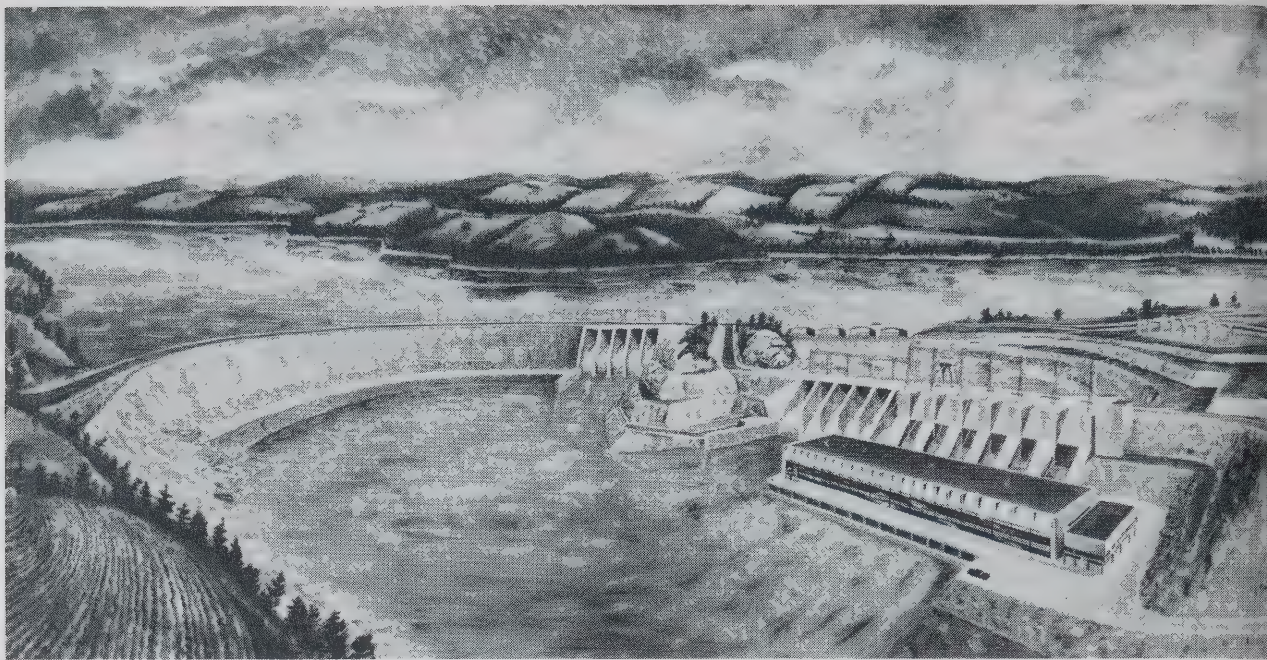
New Brunswick

New Brunswick's total generating capacity was boosted in 1965 by 44,425 kw., consisting of 30,800 kw. hydro and the remainder thermal. New capacity for 1966 is estimated at 110,000 kw. hydro and for the years subsequent to 1966, a total of 710,000 kw. is scheduled. Of the latter, hydro generating capacity scheduled for the new Mactaquac development will account for 600,000 kw.

NEW BRUNSWICK ELECTRIC POWER COMMISSION

Construction of the new Sisson hydro plant on the Tobique River was brought to completion in 1965 with the installation of a 10,000-kw. unit. The turbine at the Sisson plant is rated at 12,500 hp.

The first three units at Mactaquac on the Saint John River should come on line early in 1968. "Mactaquac", or "Big Branch" was the name given by the Maliseet Indians to a stream which joins the Saint John River at the site of the new development about 14 miles above Fredericton. The plant is designed for a total of 600,000 kw. in six units. The ratings of the turbines will be 140,000 hp. each. Units 4, 5 and 6 should be in operation by 1976. The dam at Mactaquac will create a lake about one-half mile in width and 51 miles long. The reservoir, which throughout



Artist's impression of the 600,000-kw. Mactaquac hydro development under construction on the Saint John River in New Brunswick.

its entire length will parallel the Trans-Canada Highway, is expected to become a valuable tourist asset.

The capacity of the Commission's Courtenay Bay steam plant at East Saint John was increased to 63,365 kw. in 1965 by the addition of a 13,365-kw. unit. A further boost in plant capacity is scheduled for July 1966 with the commissioning of a 110,000-kw. unit. Unit No. 4, also rated at 110,000 kw., is scheduled for September 1967. Power supply and process steam for Rothesay Paper Corporation are provided by the Courtenay Bay plant.

A 500-kw. diesel unit was installed at Grand Manan in September 1965 to replace a 240-kw. diesel unit removed from service earlier in the year. The total capacity at Grand Manan is now 1,650 kw.

The Commission's transmission network was expanded during 1965 by the addition of 15.4 miles of 138-kv. line and 29.4 miles of 69-kv. line. Another 165.7 miles of 138-kv. and 26.9 miles of 69-kv. line are under construction.

MAINE AND NEW BRUNSWICK ELECTRIC POWER COMPANY LIMITED

At the Company's Tinker hydro plant on the Aroostook River near Aroostook Junction, a new unit consisting of a 20,800-kw. generator and 33,000-hp. turbine went into service at the end of May 1965, bringing the total installed generating capacity at Tinker to 30,840 kw.

A new transformer substation with a capacity of 42,500 kva. was completed at the Tinker Plant at Aroostook Junction in April 1965.

Nova Scotia

A net total of 103,500 kw. of new thermal capacity saw initial service in the Province in 1965; there was no increase in hydro capacity. The 38,000 kw. of new capacity which will go into service in 1966 will also be thermal. Scheduled for installation subsequent to 1966 is a total of 45,350 kw., consisting of 26,600 kw. hydro and 18,750 kw. thermal. Not included is a total of 73,500 kw. of hydro capacity, 67,500 kw. of which may be developed on Wreck Cove Brook and 6,000 kw. on the Sissiboo River.

NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED

The Company's new steam plant at Tuft's Cove is now in operation with one 100,000-kw. unit, completed in August 1965. This is the first unit in a multi-unit development which may eventually provide more than 500,000 kw. of generating capacity.

The development of two hydro sites, expected to yield a combined generating capacity of 16,200 kw., is being considered by the Company. The sites are at Lequille on the Allain (Lequille) River and at Alpena on the Nictaux River. Lequille would provide 11,200 kw.

The Company's 250-kw., West Paradise hydro plant on Bloody Creek was removed from service in 1965.

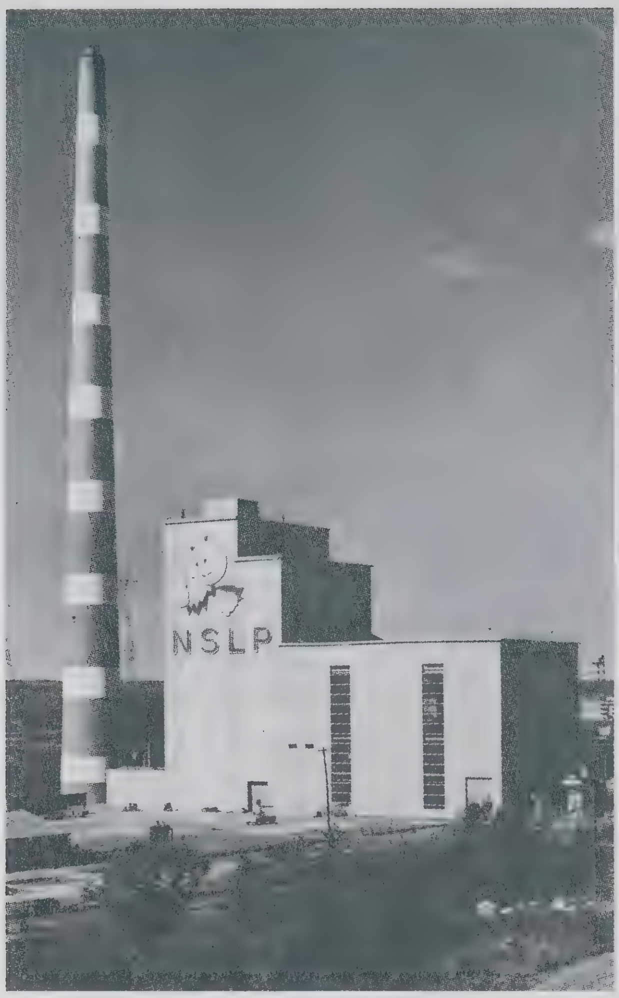
During 1965, the Company completed 3.5 miles of 138-kv. transmission line and 30.8 miles of 68-kv. line. Transformer capacity in the Company's sub-stations was increased by a net amount of 119,050 kva.

NOVA SCOTIA POWER COMMISSION

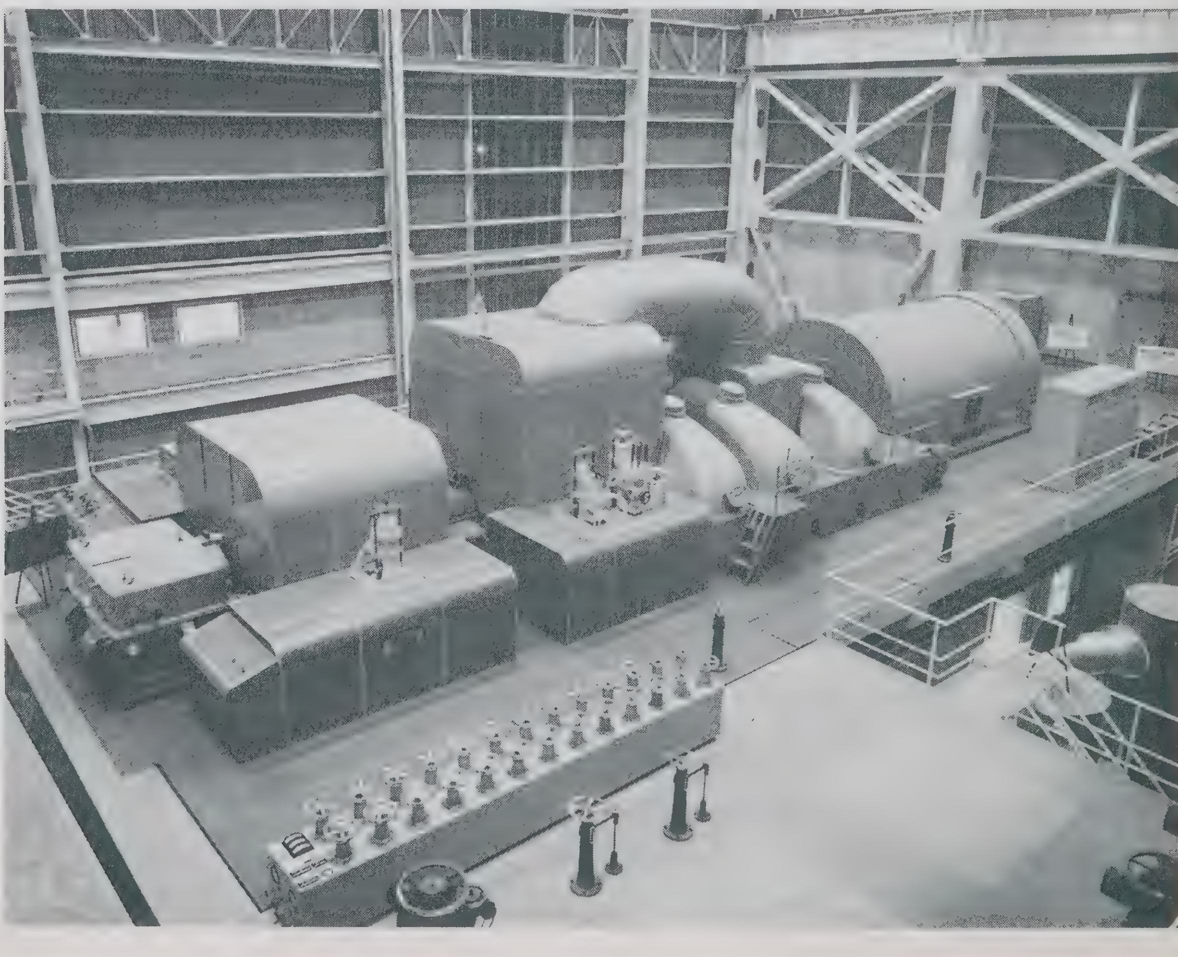
The capacity of the Weymouth Falls hydro plant on the Sissiboo River is to be more than doubled. Addition of a 10,400-kw. unit in November 1967 will bring the total plant capacity to 19,400 kw. The turbine for the new unit will be rated at 14,500 hp.

Two hydro sites being considered for development offer the possibility of a combined 73,500 kw. of new capacity. The larger of the two, Wreck Cove on Wreck Cove Brook, is proposed for development to a capacity of 67,500 kw. and Riverdale on the Sissiboo River, to 6,000 kw. Neither development has yet been scheduled.

Electric power and steam supply for the Glace Bay heavy water plant will be supplied from the Seaboard Power Corporation Glace Bay thermal station. To take care of the additional load, the Glace Bay thermal station is being extended by the addition of a 38,000-kw. steam unit, for service in July 1966. The Nova Scotia Power Commission is



Exterior and interior views of the 100,000-kw. Tuft's Cove thermal plant in Nova Scotia, commissioned in 1965.



installing the new unit and, early in 1966, reported that negotiations were nearing completion for the purchase of the entire plant from Seaboard Power Corporation Limited.

Extensions to the Commission's transmission network in 1965 amounted to 98.7 miles of 138-kv. line, 36.3 miles at 69 kv. and 49.4 miles of line with voltages from 13.8 kv. to 23 kv. Under construction at the end of the year was another 137.9 miles of 138-kv. line, 87.1 miles at 69 kv. and 5.8 miles of line with voltages from 13.8 kv. to 69 kv.

New transformer capacity totalling 133,200 kva. went into operation at Commission substations in 1965.

ATLANTIC DEVELOPMENT BOARD

In early April 1966, the Atlantic Development Board announced the granting of $12 million towards the construction of a 150,000-kw. thermal plant in Nova Scotia, probably near Trenton. While the project has not been scheduled, construction of the plant by the Nova Scotia Power Commission is expected to begin soon. This major addition is in line with the Board's policy of assisting in the improvement of the basic power facilities in the Atlantic region.

IMPERIAL OIL LIMITED

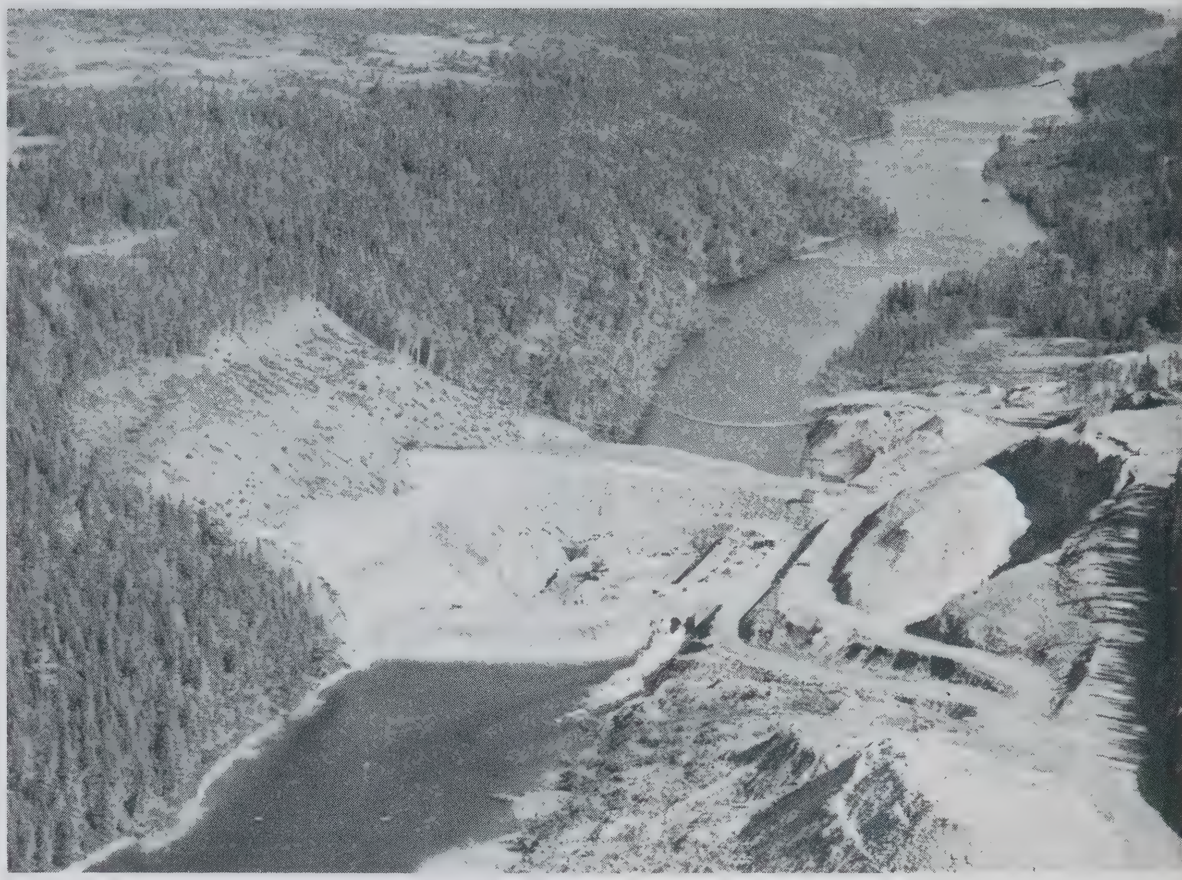
A new single-unit thermal plant with a generating capacity of 3,750 kw. went into operation at Dartmouth in September 1965.

SCOTT MARITIMES PULP LIMITED

The thermal plant which the Company is building at Abercrombie Point is expected to be ready for operation in the spring of 1967. The plant will house one unit rated at 18,750 kw.

Newfoundland

New generating capacity installed in the province during 1965 totalled 15,400 kw., most of it hydro. Two thermal units removed from service during the year reduced the increase to a net total of 13,840 kw. Of the 14,750 kw. of new capacity scheduled for 1966, 12,500 kw. will be thermal. A new hydro plant at present under construction is expected to make available 229,500 kw. of generating capacity in 1967 with provision for another 229,500 kw. later.



Construction under way at the site of the 459,000-kw. Bay d'Espoir hydro plant on the Salmon River in Newfoundland.

NEWFOUNDLAND AND LABRADOR POWER COMMISSION

The hydro plant referred to above is being built by the Commission at Bay d'Espoir on the Salmon River. The plant is designed for six units, three of which are scheduled to come into service in March 1967. The total eventual generating capacity at the Bay d'Espoir plant is expected to be 459,000 kw. and the total turbine capacity 700,000 hp.

Eleven small thermal plants with capacities ranging from 80 kw. to 300 kw. were installed in 1965, adding 1,900 kw. to the Province's thermal generating capacity. The new 12,500-kw. gas turbine plant at Holyrood being built by the Commission is expected to be in service in September 1966.

The Commission's program of hydro development on the island portion of the Province includes the building of an island-wide transmission grid consisting basically of a 230-kv. east-west "backbone" with 138-kv. extensions. This grid is designed to interconnect all the existing power generating sources on the island and in 1967 will carry hydro power from the Bay d'Espoir development.

During 1965, the transmission network was extended by 135 miles

of 25-kv. line and 119 miles of line with operating voltages between 7.2 kv. and 14.4 kv. Many more miles of line, including main 230-kv. and 138-kv. line, were under construction at the end of the year.

BOWATER POWER COMPANY LIMITED

An extensive overhaul of the seven smaller units at the Company's Deer Lake hydro plant on the Humber River was begun in 1965. Turbine runner replacement and re-wiring of generators was completed in six units increasing the total installed turbine capacity by 12,000 hp. and the total installed generating capacity by 13,500 kw. A further 2,000 hp. and 2,250 kw. was realized early in 1966 on completion of work on the seventh unit.

A total of 37 miles of 115-kv. transmission line and 7.5 miles of 25-kv. line came into service in 1965. At Springdale, the Company completed a 10,000-kva. transformer substation.

CHURCHILL FALLS POWER CORPORATION LIMITED

Development of the immense hydro potential of Churchill Falls on the Churchill River in Labrador awaits completion of marketing negotiations.

Development of the site would involve an installation of 6,150,000 hp. in ten units. The total generating capacity would be 3,914,000 kw.

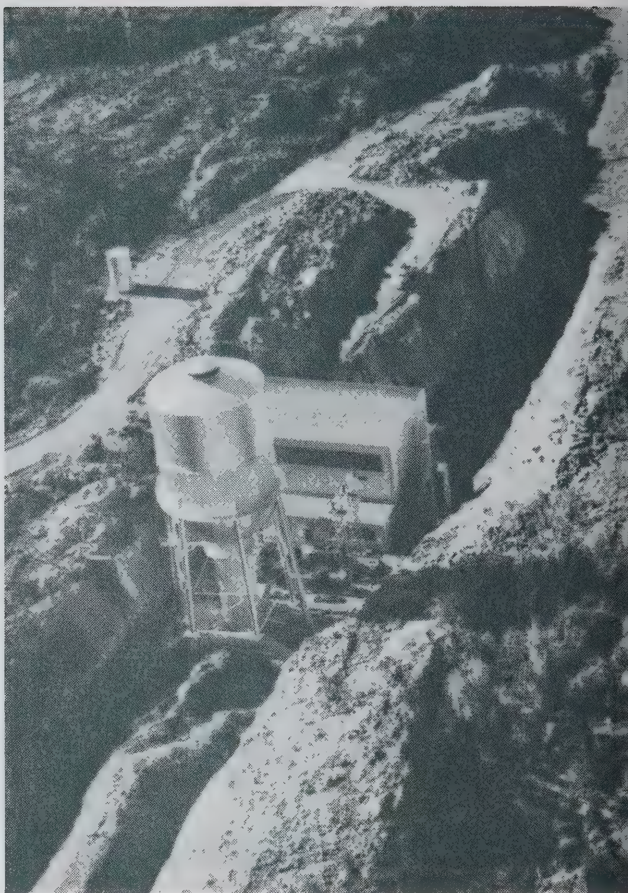
Yukon and Northwest Territories

Electric generating capacity installed in the Northwest Territories in 1965 totalled 19,650 kw., 18,000 kw. of which was hydro. The total capacity in Yukon Territory was increased by the small amount of 120 kw. of thermal equipment. Forecasts indicate a total increase in 1966 of 2,700 kw. of thermal capacity in the Northwest Territories and 600 kw., also thermal, in Yukon Territory.

NORTHERN CANADA POWER COMMISSION

Of the total of 19,610 kw. of generating capacity that saw initial service in the Northwest Territories in 1965, 19,210 kw. was installed in plants operated by the Northern Canada Power Commission.

The Twin Gorges hydro plant, completed in 1965 by the Commission, is the largest hydro plant built in the Yukon and Northwest



Hydro station and surge tank at the Twin Gorges development on the Taltson River, Northwest Territories.

Territories. The 18,000 kw., single-unit plant on the Taltson River 35 miles northeast of Fort Smith, N.W.T., doubles the hydro capacity in the Northwest Territories and increases the total electric generating capacity by almost 50 per cent.

The Twin Gorges project includes a 170-mile transmission line which carries hydro power via Fort Smith to the Pine Point base metal operations on Great Slave Lake and to the new town of Pine Point. The generating station is operated by remote control from Fort Smith.

The capacity at the Fort McPherson thermal plant was increased to 475 kw. by the addition of a 250-kw. unit. Another 250-kw. unit is expected to be installed in 1966. A 960-kw. unit went into service at Fort Smith, increasing the existing capacity to 3,240 kw. With the availability of lower-cost hydro power from the Taltson River, it is likely that 1,000 kw. of thermal capacity will be transferred from Fort Smith to Inuvik in 1966.

Other new capacity installations for 1966 include 500 kw. at the 3,460-kw. Frobisher Bay plant, 500 kw. at the 600-kw. Cambridge Bay plant, and a new 450-kw. plant at Coppermine, all in the Northwest Territories. In Yukon Territory, the Commission will build a new 600-kw. plant in 1966 at Dawson City.

YUKON ELECTRICAL COMPANY LIMITED

The Company installed a new thermal station at Stewart Crossing, Y.T., in 1965. The station houses two 60-kw. diesel units.

A 14-mile, 14.4-kv. transmission line was built to supply power from Watson Lake, Y.T., to Lower Post, B.C. A 45-mile, 23.9-kv. transmission line from Whitehorse to Carcross is at present under construction and should be in operation April 1, 1966. When this line is completed, the 160-kw. diesel plant at Carcross will be dismantled. Scheduled for operation May 1, 1966, is a 12-mile, 14.4-kv. line from Destruction Bay to Burwash Landing.

NORTHLAND UTILITIES

The Company has increased the capacity of its Hay River thermal plant to 1,975 kw. with the addition of a 250-kw. unit. Two 40-kw. units at Enterprise were dismantled and power will be supplied to Enterprise by transmission line from Hay River.

Two 75-kw. units were installed by the Company to supply power at Fort Providence.

TABULAR SUMMARY - HYDRO

DEVELOPMENT	RIVER	HYDRO-ELECTRIC CAPACITY: Installed during 1965 — No. of Units	Installed during 1965 — Total Turbine Capacity hp.	Installed during 1965 — Total Generator Capacity kw.	Total Station Capacity at end 1965 — Turbine hp.	Total Station Capacity at end 1965 — Generator kw.	Proposed for Installation in 1966 — No. of Units	Proposed in 1966 — Total Turbine Capacity hp.	Proposed in 1966 — Total Generator Capacity kw.	Proposed after 1966 — No. of Units	Proposed after 1966 — Total Turbine Capacity hp.	Proposed after 1966 — Total Generator Capacity kw.	REMARKS
British Columbia													
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY													
Portage Mountain	Peace									10	3,100,000	2,270,000	
ALUMINUM COMPANY OF CANADA LTD.													
Kemano	Nechako to Kemano				1,050,000	707,200				1	150,000	105,600	
CITY OF REVELSTOKE													
Walter Hardman	Cranberry Creek	1	5,800	4,000	11,600	8,000							
CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED													
Waneta	Pend d'Oreille				370,000	216,000	1	120,000	76,000				
TOTAL			5,800	4,000				120,000	76,000		3,250,000	2,375,600	
Northwest Territories													
NORTHERN CANADA POWER COMMISSION													
Taltson	Taltson	1	25,000	18,000	25,000	18,000							
TOTAL			25,000	18,000									

Alberta

CALGARY POWER LTD.													
Big Bend	Brazeau	1	210,000	144,000	210,000	144,000	1	250,000	175,000				
Pumping-Generating	Brazeau	1	12,500	9,720	12,500	9,720	1	12,500	9,720				
TOTAL			222,500	153,720				262,500	184,720				

Saskatchewan

SASKATCHEWAN POWER CORP.													
Squaw Rapids	Saskatchewan				276,000	201,000	1	60,000	43,000	1	60,000	43,000	
Coteau Creek	South Saskatchewan									3	252,000	186,600	
TOTAL								60,000	43,000		312,000	229,600	

Manitoba

MANITOBA HYDRO													
Grand Rapids	Saskatchewan	3	450,000	330,000	450,000	330,000					150,000	110,000	
TOTAL			450,000	330,000							150,000	110,000	

Ontario

ONTARIO HYDRO													
Harmon	Mattagami	2	188,000	129,200	188,000	129,200							Provision for two other units.
Kipling	Mattagami						2	188,000	125,400				Provision for two other units.
Mountain Chute	Madawaska									2	224,000	139,500	Both units scheduled for service in 1967.
Barrett Chute	Madawaska				56,000	40,800				2	168,000	120,000	The two new units are scheduled for service in 1968.
Stewartville	Madawaska				84,000	61,200				2	140,000	100,000	The two new units are scheduled for service in 1969.
TOTAL			188,000	129,200				188,000	125,400		532,000	359,500	

DEVELOPMENT	RIVER	HYDRO-ELECTRIC CAPACITY											REMARKS
		INSTALLED DURING 1965			TOTAL STATION CAPACITY AT END 1965		PROPOSED FOR INSTALLATION IN 1966			PROPOSED FOR INSTALLATION AFTER 1966			
		No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	Turbine hp.	Generator kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	
Quebec													
MANICOUAGAN POWER COMPANY													
McCormick	Manicouagan	2	160,000	120,000	452,400	311,250							
QUEBEC HYDRO													
Manic 2	Manicouagan	5	850,000	635,000	850,000	635,000	2	340,000	254,000	1	170,000	127,000	Last unit scheduled for 1967.
Manic 1	Manicouagan						2	160,000	123,320	1	80,000	61,660	Last unit scheduled for 1967.
Manic 5	Manicouagan									8	1,800,000	1,344,000	First power in 1970 and completion of entire development in 1972.
Manic 3	Manicouagan									7	1,505,000	1,120,000	Proposed for service in the years 1972-74.
Outardes 4	Outardes									4	864,000	632,000	Three units scheduled for service in 1968 and the fourth in 1969.
Outardes 3	Outardes									4	1,034,000	756,000	Three units scheduled for service in 1968 and the fourth in 1969.
Outardes 2	Outardes									3	612,000	447,000	Three units scheduled for service in 1968. This is a new station adjacent to the existing 50,000-kw. Outardes Falls station.
Rapide-des-Îles	Ottawa (Upper)						2	100,000	74,600	2	100,000	74,600	Third unit scheduled for service in 1967; fourth unit not scheduled.
First Falls	Ottawa (Upper)									4	160,000	112,000	One unit scheduled for initial operation in each year 1968-1970; fourth unit not scheduled.
TOTAL			1,010,000	755,000				600,000	451,920		6,325,000	4,674,260	

New Brunswick

MAINE AND NEW BRUNSWICK ELECTRIC POWER COMPANY LTD.													
Tinker	Aroostook	1	33,000	20,800	47,000	30,840							
NEW BRUNSWICK ELECTRIC POWER COMMISSION													
Sisson	Tobique	1	12,500	10,000	12,500	10,000							
Mactaquac	Saint John									6	840,000	600,000	Three units scheduled for service early in 1968; the remaining units by 1976.
TOTAL			45,500	30,800							840,000	600,000	

Nova Scotia

NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED													
Lequille	Allain									1	15,000	11,200	
Alpena	Nictaux									1	6,500	5,000	
Weymouth Falls	Sissiboo				12,000	9,000				1	14,500	10,400	
Wreck Cove	Wreck Cove Brook												Installation of 67,500 kw. under consideration.
Riverdale	Sissiboo												Installation of a single 8,000-hp., 6,000-kw. plant under consideration.
West Paradise	Bloody Creek												One unit consisting of a 250-kw. generator and 315-hp. turbine removed from service.
TOTAL			0	0	(new capacity)						36,000	26,600	
			315	250	(removed from service)								
			315	250	(net decease)								

DEVELOPMENT	RIVER	HYDRO-ELECTRIC CAPACITY											REMARKS
		INSTALLED DURING 1965			TOTAL STATION CAPACITY AT END 1965		PROPOSED FOR INSTALLATION						
							IN 1966			AFTER 1966			
		No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	Turbine hp.	Generator kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	No. of Units	Total Turbine Capacity hp.	Total Generator Capacity kw.	
Newfoundland													
NEWFOUNDLAND AND LABRADOR POWER COMMISSION													
Bay d'Espoir	Salmon									6	700,000	459,000	First power in 1967 when three units are scheduled for initial operation.
BOWATER POWER COMPANY LTD.													
Deer Lake	Humber		12,000	13,500	168,000	121,750		2,000	2,250				Increased in capacity due to runner replacement and generator re-winding of seven of the nine units.
TOTAL			12,000	13,500				2,000	2,250		700,000	459,000	
NET TOTAL FOR **Canada**			1,735,985	1,433,970				970,000	883,290		12,105,000	8,834,560	

TABULAR SUMMARY - THERMAL

THERMAL - ELECTRIC CAPACITY

DEVELOPMENT	Type	Installed During 1965: No. of Units	Installed During 1965: Total Capacity kw.	Total Station Capacity at End 1965 kw.	Proposed in 1966: No. of Units	Proposed in 1966: Total Capacity kw.	Proposed after 1966: No. of Units	Proposed after 1966: Total Capacity kw.	REMARKS
British Columbia									
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY									
Burrard	S	1	150,000	450,000			1	150,000	
Chetwynd	IC & GT	3	12,000	21,000					
Mica	IC	4	5,175	5,175					
Hazelton	IC	7	3,650	3,650					
Smithers	IC	1	3,000	6,880					
Stewart	IC	3	1,400	1,400					
Burns Lake	IC	1	1,136	4,072					
Port Hardy	IC	1	1,000	2,700					
Gold River	IC	2	1,000	1,000					
MacMILLAN, BLOEDEL AND POWELL RIVER LIMITED									
Powell River	S			14,925	1	30,000			
COLUMBIA CELLULOSE COMPANY LTD.									
Watson Island	S				1	34,560			
TOTAL			178,361			64,560		150,000	

IC - Internal Combustion, GT - Gas Turbine, S - Steam

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY: INSTALLED DURING 1965		THERMAL - ELECTRIC CAPACITY: TOTAL STATION CAPACITY AT END 1965 kw.	PROPOSED FOR INSTALLATION: IN 1966		PROPOSED FOR INSTALLATION: AFTER 1966		REMARKS
		No. of Units	Total Capacity kw.		No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	
Northwest Territories									
NORTHERN CANADA POWER COMMISSION									
Fort Smith	IC	1	960	3,240					
Fort McPherson	IC	1	250	475	1	250			
Frobisher Bay	IC			3,460	1	500			
Inuvik	IC			3,460	1	1,000			
Cambridge Bay	IC			600	2	500			
Coppermine	IC				3	450			
NORTHLAND UTILITIES LIMITED									
Hay River	IC	1	250	1,975					
Fort Providence	IC	2	150	150					
Enterprise	IC								Two 40-kw. units removed from service.
TOTAL			1,610	(new capacity)		2,700			
			80	(removed from service)					
			1,530	(net increase)					

Yukon

NORTHERN CANADA POWER COMMISSION									
Dawson City	IC				3	600			
YUKON ELECTRICAL COMPANY LIMITED									
Stewart Crossing	IC	2	120	120					
TOTAL			120			600			

Alberta

CALGARY POWER LTD.									
Wabamun	S			282,000			1	300,000	
CANADIAN UTILITIES LIMITED									
Battle River (Forestburg)	S			66,000			1	150,000	Original plans called for a 75,000-kw. addition.
Simonette (Clear Hills)	GT				1	20,000			
CITY OF EDMONTON									
Edmonton	S			330,000	1	75,000			
Edmonton	S						2	330,000	First unit for service in 1970; second unit scheduled for 1973.
CHEMCELL (1963) LIMITED									
Clover Bar (Edmonton)	S			18,000	1	4,000			
TOTAL						99,000		780,000	

IC - Internal Combustion, GT - Gas Turbine, S - Steam

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY							REMARKS
		INSTALLED DURING 1965		TOTAL STATION CAPACITY AT END 1965 kw.	PROPOSED FOR INSTALLATION				
					IN 1966		AFTER 1966		
		No. of Units	Total Capacity kw.		No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	
Saskatchewan									
SASKATCHEWAN POWER CORPORATION									
Boundary Dam (Estevan)	S			132,000			2	300,000	
Swift Current				14,550	1	15,000			Addition of one or two other units in 1967 is under consideration.
TOTAL						15,000		300,000	
Ontario									
ONTARIO HYDRO									
Lakeview (Toronto)	S	1	300,000	1,200,000	1	300,000	3	900,000	Plant scheduled for completion in 1968 with a total of eight units.
A. W. Manby (Toronto)	GT	2	32,640	32,640	2	32,640			
Sarnia-Scott (Sarnia)	GT	2	30,000	30,000					
Douglas Point (between Kincardine & Port Elgin)	N				1	200,000			
Lambton (Sarnia)	S						4	2,000,000	One unit scheduled for initial operation in each year from 1968 to 1971.
Pickering (Toronto)	N						2	1,080,000	One unit scheduled for operation in 1970, the second in 1971.
TOTAL			362,640			532,640		3,980,000	

Quebec

QUÉBEC HYDRO									
Tracy	S	1	150,000	300,000			2	300,000	Last two units scheduled for 1967.
Gaspé	S						2	300,000	Due to come into service in 1970.
TOTAL			150,000					600,000	

New Brunswick

NEW BRUNSWICK ELECTRIC POWER COMMISSION									
Courtenay Bay (East Saint John)	S	1	13,365	63,365	1	110,000	1	110,000	One major unit scheduled for initial service in 1966 and another in 1967.
Grand Manan	IC	1	260	1,650					One 240-kw. unit replaced with a 500 kw. unit.
TOTAL			13,625			110,000		110,000	

Nova Scotia

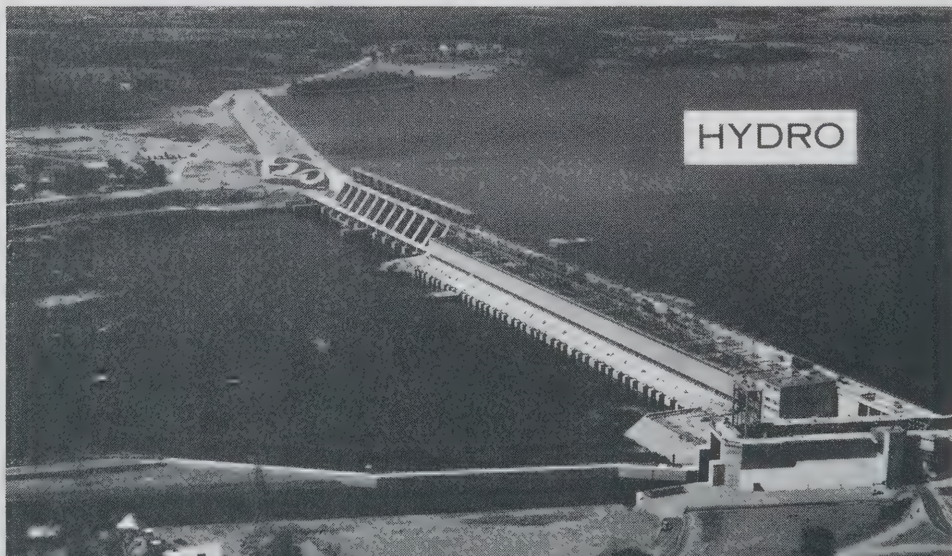
NOVA SCOTIA LIGHT AND POWER COMPANY LIMITED									
Tufts Cove	S	1	100,000	100,000					
IMPERIAL OIL LIMITED									
Dartmouth		1	3,750	3,750					
NOVA SCOTIA POWER COMMISSION									
Glace Bay	S			72,000	1	38,000			Plant owned by Seaboard Power Corporation Limited.
SCOTT MARITIMES PULP LIMITED									
Abercrombie Point							1	18,750	
TOTAL			103,750			38,000		18,750	

IC - Internal Combustion, GT - Gas Turbine, N - Nuclear, S - Steam

DEVELOPMENT	Type	THERMAL - ELECTRIC CAPACITY							REMARKS
		INSTALLED DURING 1965		TOTAL STATION CAPACITY AT END 1965 kw.	PROPOSED FOR INSTALLATION				
					IN 1966		AFTER 1966		
		No. of Units	Total Capacity kw.		No. of Units	Total Capacity kw.	No. of Units	Total Capacity kw.	
Newfoundland									
NEWFOUNDLAND AND LABRADOR POWER COMMISSION									
Holyrood	GT				1	12,500			
BRITISH NEWFOUNDLAND EXPLORATION LIMITED									
Whalesback	IC			350					Two units totalling 1,560-kw. removed from service.
TOTAL			0	(new capacity)		12,500			
			1,560	(removed from service)					
			1,560	(net decrease)					
NET TOTAL FOR **Canada**			808,466			875,000		6,800,750	

GT - Gas Turbine, IC - Internal Combustion

ELECTRIC POWER GENERATING STATIONS


HYDRO

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.

British Columbia

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Kemano	Nechako to Kemano	ALCAN	1954	1958	2,500	4	150,000		97,600	
							3	150,000	1,050,000	105,600	707,200
2	Bridge River No. 2	Bridge to Seton Lake	BCHPA	1959	1960	1,264	4	82,000	328,000	62,000	248,000
3	Waneta	Pend d'Oreille	CMSC	1954	1963	210	1	130,000		72,000	
							2	120,000	370,000	72,000	216,000
4	Bridge River No. 1	Bridge to Seton Lake	BCHPA	1948	1954	1,264	4	69,000	276,000	45,000	180,000
5	Cheakamus	Cheakamus to Squamish	BCHPA	1957	1957	954	2	95,000	190,000	70,000	140,000
6	John Hart	Campbell	BCHPA	1947	1953	390	6	28,000	168,000	20,000	120,000
7	Ruskin	Stave	BCHPA	1930	1950	123	3	47,000	141,000	35,200	105,600
8	Brilliant	Kootenay	CMSC	1944	1949	90	3	37,000	111,000	27,200	81,600
9	Wahleach	Wahleach Lake to Fraser	BCHPA	1952	-	1,880	1	82,000	82,000	60,000	60,000
10	Upper Bonnington	Kootenay	CMSC	1907	1940	70	2	8,000		5,062	
							2	9,000		6,750	
							2	26,000	86,000	15,750	55,124
11	Ladore Falls	Campbell	BCHPA	1956	1957	122	2	35,000	70,000	27,000	54,000
12	Stave Falls	Stave	BCHPA	1912	1925	110	4	13,000		10,500	
						113	1	15,000	67,000	10,500	52,500
13	Lake Buntzen No. 1	Lake Buntzen to Burrard Inlet	BCHPA	1951	-	380	1	70,000	70,000	50,000	50,000
14	South Slocan	Kootenay	CMSC	1928	1929	70	3	25,000	75,000	15,750	47,250
15	Lower Bonnington	Kootenay	WKPL	1925	1926	70	3	20,000	60,000	15,750	47,250
16	Seton	Seton Creek	BCHPA	1956	-	147	1	58,500	58,500	42,000	42,000
17	Corra Linn	Kootenay	CMSC	1932	1932	53	3	19,000	57,000	13,500	40,500
18	Whatshan	Whatshan	BCHPA	1951	1956	690	3	16,500	49,500	11,250	33,750
19	Strathcona	Campbell	BCHPA	1958	-	140	1	42,000	42,000	33,750	33,750
20	Stillwater	Lois	MBPR	1930	1948	-	2	25,000	50,000	16,200	32,400
21	Clowhom Falls	Clowhom	BCHPA	1958	-	145	1	40,000	40,000	30,000	30,000
22	Puntledge	Puntledge	BCHPA	1955	-	340	1	35,000	35,000	27,000	27,000
23	Lake Buntzen No. 2	Lake Buntzen to Burrard Inlet	BCHPA	1913	1919	380	3	13,500	40,500	8,900	26,700
24	Jordan River	Jordan	BCHPA	1911	1931	1,010	2	5,430		3,200	
							1	10,125		8,000	
							1	18,000	38,985	12,000	26,400
25	Ash River	Ash	BCHPA	1959	-	735	1	35,000	35,000	25,200	25,200
26	La Joie	Bridge	BCHPA	1957	-	176	1	30,000	30,000	22,000	22,000
27	Powell River	Powell	MBPR	1911	1926	157	1	13,500		12,000	
						147	1	3,600		3,750	
						147	2	3,000	23,100	2,800	21,350
28	Elko	Elk	EKPC	1923	1924	190	2	7,500	15,000	6,000	12,000
29	Falls River	Big Falls Creek	BCHPA	1930	1960	248	2	6,000	12,000	4,800	9,600

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
BRITISH COLUMBIA (Cont'd)											
30	Ocean Falls	Link	CZC	1917	1932	150	1	2,100		1,720	
							1	2,100		1,750	
							2	6,300	16,800	4,200	11,870
31	Nelson	Kootenay	CN	1907	1950	60	1	1,670		750	
						60	1	1,900		1,000	
						70	1	3,000		2,120	
						70	1	6,750	13,320	4,800	8,670
32	Alouette	Alouette Lake to Stave Lake	BCHPA	1928	-	125.5	1	12,500	12,500	8,000	8,000
33	Walter Hardman	Cranberry Creek	COR	1960	1965	770	2	5,800	11,600	4,000	8,000
34	Beach	Britannia Creek	ACL	1916	'1917	1,835	2	3,750		2,000	
		Furry Creek				760	1	3,750	11,250	2,000	6,000
35	Shuswap Falls	Shuswap	BCHPA	1929	1942	72	1	3,800		2,400	
						82	1	4,000	7,800	2,800	5,200
36	Aberfeldie	Bull	EKPC	1922	1922	275	2	3,650	7,300	2,500	5,000
37	Spillimacheen	Spillimacheen	BCHPA	1955	1955	207	2	1,200		900	
							1	3,000	5,400	2,200	4,000
38	Woodfibre	Woodfibre Creek	RC	1947	-	920	1	3,650	3,650	2,250	2,250
39	Port Alice	Victoria Lake to Neroutsos Inlet	RC	1953	-	425	1	3,200	3,200	2,000	2,000
Total capacity of plants under 1,500 kw.									11,995		7,848
Total capacity of turbines connected directly to mechanical equipment									41,710		
Total (all plants)									3,817,110		2,616,012

Yukon Territory

1	Whitehorse Rapids	Yukon	NCPC	1958	1958	61	2	7,500	15,000	5,695	11,390
2	North Fork	Klondike	YCGC	1911	1935	220	1	5,000		3,600	
							1	5,000		2,700	
							1	5,000	15,000	3,750	10,050
3	Mayo River	Mayo	NCPC	1952	1957	110	2	3,000	6,000	2,550	5,100
Total capacity of plants under 1,500 kw.									2,140		1,650
Total capacity of turbines connected directly to mechanical equipment									-		
Total (all plants)									38,140		28,190

Northwest Territories

1	Taltson	Taltson	NCPC	1965	-	-	1	25,000	25,000	18,000	18,000
2	Snare Falls	Snare	NCPC	1960	-	63	1	9,200	9,200	7,000	7,000
3	Snare Rapids	Snare	NCPC	1948	-	56	1	8,350	8,350	7,000	7,000
4	Bluefish Lake	Yellowknife	CMSC	1941	-	110	1	4,700	4,700	3,360	3,360
Total capacity of plants under 1,500 kw.											
Total capacity of turbines connected directly to mechanical equipment											
Total (all plants))									47,250		35,360

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.

Alberta

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Big Bend	Brazeau	CP	1965	-	386	1	210,000	210,000	144,000	144,000
2	Spray	Spray Diversion	CP	1951	1960	875	2	62,000	124,000	40,400	80,800
3	Rundle	Spray Diversion	CP	1951	1960	318	1	23,000		17,000	
						317	1	40,000	63,000	29,750	46,750
4	Ghost	Bow	CP	1929	1954	105	2	18,000		12,750	
						92	1	30,000	66,000	21,150	46,650
5	Cascade	Cascade	CP	1942	1957	320	2	23,000	46,000	17,000	34,000
6	Horseshoe	Bow	CP	1953	1955	72	2	4,680		3,375	
							2	7,500	24,360	5,625	18,000
7	Kananaskis	Bow	CP	1913	1951	68	2	6,000		3,400	
						70	1	12,000	24,000	9,560	16,360
8	Bearspaw	Bow	CP	1954	-	48	1	20,750	20,750	15,300	15,300
9	Pocaterra	Kananaskis	CP	1955	-	185	1	18,400	18,400	13,500	13,500
10	Pumping-Generating Station	Brazeau	CP	1965	-	–	1	12,500	12,500	9,720	9,720
11	Barrier	Kananaskis	CP	1947	-	135	1	13,500	13,500	9,560	9,560
12	Interlakes	Kananaskis	CP	1955	-	98	1	6,900	6,900	5,040	5,040
13	Three Sisters	Spray Diversion	CP	1951	-	50	1	3,600	3,600	3,400	3,400
	Total capacity of plants under 1,500 kw.								1,940		1,430
	Total capacity of turbine connected directly to mechanical equipment										
	Total (all plants)								634,950		444,510

Saskatchewan

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Squaw Rapids	Saskatchewan	SPC	1963	1964	107	6	46,000	276,000	33,500	201,000
2	Island Falls	Churchill	CRPC	1930	1959	56	3	16,500		11,880	
							3	19,000		18,000	
							1	19,000	125,500	17,100	106,740

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
SASKATCHEWAN (Cont'd)											
3	Waterloo Lake	Charlot	EMR	1961	-	63	1	10,000	10,000	7,500	7,500
4	Wellington Lake	Charlot	CMSC	1939	1960	70	2	3,300	6,600	2,400	4,800
Total capacity of plants under 1,500 kw.									-		-
Total capacity of turbines connected directly to mechanical equipment									-		
Total (all plants)									418,100		320,040

Manitoba

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Grand Rapids	Saskatchewan	MH	1965	1965	-	3	150,000	450,000	110,000	330,000
2	Kelsey	Nelson	MH	1960	1961	50	5	42,000	210,000	33,750	168,750
3	Seven Sisters	Winnipeg	MH	1931	1952	66	6	37,500	225,000	27,625	165,750
4	Great Falls	Winnipeg	MH	1923	1928	58	6	28,000	168,000	18,900	113,400
5	Pine Falls	Winnipeg	MH	1951	1952	37	6	19,000	114,000	13,950	83,700
6	Slave Falls	Winnipeg	WH	1931	1948	30	8	12,000	96,000	9,000	72,000
7	Pointe du Bois	Winnipeg	WH	1911	1925	45	5	5,200		3,000	
							3	6,800		4,000	
							3	6,900		5,200	
							3	7,300		5,200	
							2	8,000	105,000	5,200	68,600
8	McArthur Falls	Winnipeg	MH	1954	1955	23	8	10,000	80,000	7,650	61,200
9	Laurie River No. 2	Laurie	SGM	1958	-	55	1	7,000	7,000	5,400	5,400
10	Laurie River No. 1	Laurie	SGM	1950	1952	55	2	3,500	7,000	2,475	4,950
Total capacity of plants under 1,500 kw.									-		-
Total capacity of turbines connected directly to mechanical equipment									-		
Total (all plants)									1,462,000		1,073,750

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
	Ontario										
1	Sir Adam Beck-Niagara: Generating Station No. 1	Niagara	HEPCO	1922	1930	305	5	55,000		36,000	
						294	2	58,000		43,200	
						294	1	58,000		44,000	
						294	2	58,000	565,000	46,750	403,900
	Generating Station No. 2			1954	1958	292	16	105,000	1,680,000	76,475	1,223,600
	Pumping-Generating Station			1957	1958	85	6	46,000	276,000	29,450	176,700
2	Robert H. Saunders - St. Lawrence	St. Lawrence	HEPCO	1958	1959	81	16	75,000	1,200,000	57,000	912,000
3	Des Joachims	Ottawa	HEPCO	1950	1951	130	8	62,000	496,000	45,000	360,000
4	Abitibi Canyon	Abitibi	HEPCO	1933	1959	237	4	66,000		41,225	
							1	66,000	330,000	43,200	208,100
5	Otto Holden	Ottawa	HEPCO	1952	1953	77	4	35,000		25,650	
							4	33,000	272,000	25,650	205,200
6	Otter Rapids	Abitibi	HEPCO	1961	1963	107	4	60,000	240,000	43,700	174,800
7	Ontario Power	Niagara	HEPCO	1905	1919	-	3	11,700		7,500	
							4	11,700		8,770	
							7	13,400		8,775	
							1	20,000	195,700	13,500	132,505
8	Harmon	Mattagami	HEPCO	1965	1965	-	2	94,000	188,000	64,600	129,200
9	Pine Portage	Nipigon	HEPCO	1950	1954	105	2	41,000		29,700	
							2	45,000	172,000	34,650	128,700
10	Chenaux	Ottawa	HEPCO	1950	1951	40	8	21,000	168,000	15,300	122,400
11	Little Long	Mattagami	HEPCO	1963	1963	90	2	84,000	168,000	60,800	121,600
12	DeCew Falls No. 2	Welland Canal	HEPCO	1943	1947	280	2	75,000	150,000	57,600	115,200
13	Rankine	Niagara	CNPC	1904	1924	133	5	10,250		7,500	
							2	12,500		9,375	
							3	10,750		9,375	
							1	12,000	120,500	10,300	94,675
14	Toronto Power	Niagara	HEPCO	1906	1915	-	7	15,000		9,000	
							4	13,000	157,000	7,200	91,800
15	Chats Falls	Ottawa	HEPCO	1931	1931	53	4	28,000	112,000	22,325	89,300
16	Caribou Falls	English	HEPCO	1958	1958	58	3	34,000	102,000	25,650	76,950
17	Cameron Falls	Nipigon	HEPCO	1920	1958	72	2	12,500		9,540	
						72	4	12,500		8,480	
						73	1	25,000	100,000	19,000	72,000
18	Manitou Falls	English	HEPCO	1956	1958	54	5	18,500	92,500	14,400	72,000
19	Alexander	Nipigon	HEPCO	1930	1958	60	3	18,000		12,750	
						58	2	19,000	92,000	13,500	65,250
20	Whitedog Falls	Winnipeg	HEPCO	1958	1958	50	3	27,000	81,000	21,600	64,800
21	Stewartville	Madawaska	HEPCO	1948	1948	148	3	28,000	84,000	20,400	61,200
22	Smoky Falls	Mattagami	SFPPC	1928	1931	-	4	18,750	75,000	13,200	52,800
23	Silver Falls	Kaministikwia	HEPCO	1959	-	330	1	60,000	60,000	45,000	45,000
24	Geo. W. Rayner	Mississagi	HEPCO	1950	1950	210	2	29,000	58,000	21,150	42,300

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
25	Barrett Chute	Madawaska	HEPCO	1942	1942	150	2	28,000	56,000	20,400	40,800
26	Upper Falls	Montreal	GLPC	1937	1957	232	2	12,600		9,000	
							1	31,000	56,200	22,500	40,500
27	Aguasabon	Aguasabon	HEPCO	1948	1948	290	2	27,500	55,000	20,250	40,500
28	Red Rock Falls	Mississagi	HEPCO	1960	1961	93	2	26,500	53,000	20,250	40,500
29	Island Falls	Abitibi	APPC	1924	1925	65	4	12,000	48,000	9,600	38,400
30	DeCew Falls No. 1	Welland Canal	HEPCO	1901	1913	-	1	3,000		2,500	
							2	3,000		2,000	
							1	6,000		4,800	
							1	6,000		5,000	
							2	6,000		5,300	
							1	6,000		5,600	
							1	6,000	45,000	5,900	38,400
31	Kakabeka Falls	Kaministikwia	HEPCO	1906	1914	178	3	7,500		5,400	
							1	12,500	35,000	7,970	24,170
32	High Falls	Michipicoten	GLPC	1930	1950	147	2	11,000		6,750	
							1	13,200	35,200	9,675	23,175
33	Big Eddy	Spanish	HCL	1929	1929	90	3	9,400	28,200	7,200	21,600
34	Sault Ste. Marie	St. Mary	GLPC	1918	1931	18.5	24	900		650	
							3	2,400		1,440	
							1	2,200	31,000	1,600	21,520
35	Iroquois Falls	Abitibi Lake & Black River	APPC	1949	1949	43	1	1,800		1,200	
							1	1,800		1,280	
							1	2,200		1,200	
							6	2,200		1,280	
							5	2,500	31,500	2,025	21,485
36	Twin Falls	Abitibi	APPC	1921	1925	57.5	5	6,000	30,000	4,050	20,250
37	Gartshore Falls	Montreal	GLPC	1958	-	112	1	30,300	30,300	20,000	20,000
38	Hollingsworth Falls	Michipicoten	GLPC	1959	-	108	1	30,300	30,300	20,000	20,000
39	Ear Falls	English	HEPCO	1930	1948	36	1	5,000		4,000	
							1	5,000		3,825	
							2	7,500	25,000	5,400	18,625
40	Norman	Winnipeg (West Branch)	OMPP	1925	1925	20	5	3,400	17,000	3,300	16,500
41	Lower Falls	Montreal	GLPC	1938	1941	185	2	10,900	21,800	8,100	16,200
42	Hogg	Montreal	GLPC	1964	-	78	1	21,750	21,750	15,000	15,000
43	Espanola	Spanish	KVPC	1906	1946	64	4	1,675		1,250	
						64	1	10,000		7,500	
						64	1	2,350	19,050	1,750	14,250
44	Scott Falls	Michipicoten	GLPC	1952	1952	70	2	10,000	20,000	6,800	13,600
45	High Falls	Spanish	HCL	1905	1918	85	4	3,550		2,000	
							1	7,500	21,700	5,550	13,550
46	Fort Frances	Rainy	OMPP	1955	1955	28	8	2,000	16,000	1,600	12,800
47	Thorold	Welland Canal	STLSA	1932	1932	160	3	5,000	15,000	4,000	12,000
48	Wawaitin	Mattagami	HEPCO	1912	1918	125	2	3,450		2,500	
							2	4,000	14,900	3,375	11,750
49	Kenora	Winnipeg	OMPP	1923	1924	20	4	1,200		1,000	
							6	1,200	12,000	1,250	11,500

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
50	Heely Falls	Trent	HEPCO	1913	1919	73	2	5,600		3,750	
							1	5,600	16,800	3,000	10,500
51	McPhail Falls	Michipicoten	GLPC	1954	1954	48	2	7,500	15,000	5,000	10,000
52	Upper Notch	Montreal	HEPCO	1930	1930	48	2	6,500	13,000	4,800	9,600
53	Calm Lake	Seine	OMPP	1928	1928	82	2	6,500	13,000	4,675	9,350
54	Sturgeon Falls	Sturgeon	APPC	1902	1964	40.5	1	2,500		1,800	
							1	1,000		1,685	
							1	1,500		1,350	
							1	1,500		1,685	
							1	1,500		1,415	
							1	1,000	9,000	1,415	9,350
55	Eddy	Ottawa	EBEC	1909	1912	38	2	4,650		3,000	
							1	4,650	13,950	3,320	9,320
56	Crystal Falls	Sturgeon	HEPCO	1921	1921	33	4	2,600	10,400	2,020	8,080
57	Ranney Falls	Trent	HEPCO	1922	1926	-	1	1,000		720	
							2	5,000	11,000	3,600	7,920
58	Chaudière Falls No. 4	Ottawa	OHEC	1931	1931	38	2	5,400	10,800	3,960	7,920
59	Big Eddy	Muskoka	HEPCO	1941	1941	38	2	5,280	10,560	3,825	7,650
60	Ragged Rapids	Muskoka	HEPCO	1938	1938	38	2	5,200	10,400	3,825	7,650
61	Sturgeon Falls	Seine	OMPP	1927	1927	62	2	5,000	10,000	3,825	7,650
62	Matabitchuan	Matabitchuan	HEPCO	1910	1910	305	4	3,300	13,200	1,690	6,760
63	Lower Sturgeon	Mattagami	HEPCO	1923	1923	42	2	4,000	8,000	3,200	6,400
64	Smooth Rock Falls	Mattagami	APPC	1916	1916	45	2	4,500	9,000	2,800	5,600
65	Nairn	Spanish	HCL	1917	1917	30	2	2,000		1,500	
							1	2,600	6,600	1,875	4,875
66	Eugenia	Beaver	HEPCO	1915	1920	550	2	2,250		1,200	
							1	4,000	8,500	2,400	4,800
67	Meyerburg (Dam 8)	Trent	HEPCO	1924	1924	32	3	2,200	6,600	1,600	4,800
68	Chaudière Falls No. 2	Ottawa	OHEC	1909	1936	40	3	2,300	6,900	1,462	4,386
69	Peterborough	Otonabee	PHPC	1902	1950	27	1	2,300		1,200	
							1	2,550		1,500	
							1	2,140	6,990	1,400	4,100
70	Coniston	Wanapitei	HEPCO	1905	1915	53	1	1,200		720	
							1	1,600		1,125	
							1	3,500	6,300	2,250	4,095
71	Stinson	Wanapitei	HEPCO	1925	1925	-	2	3,500	7,000	2,000	4,000
72	Calabogie	Madawaska	HEPCO	1917	1917	30	2	3,000	6,000	2,000	4,000
73	Big Chute	Severn	HEPCO	1911	1919	56	3	1,300		900	
							1	2,300	6,200	1,280	3,980
74	South Falls	South Muskoka	HEPCO	1916	1925	107	1	1,000		635	
							2	2,200	5,400	1,600	3,835

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)											
75	Wabagishik	Vermilion	HCL	1912	1935	70	1	2,700		1,500	
							1	2,700	5,400	2,140	3,640
76	Swift Rapids	Severn	OWLP	1917	1917	47	3	2,120	6,360	1,200	3,600
77	Minden	Gull	OWLP	1935	1935	70	2	2,600	5,200	1,800	3,600
78	Sandy Falls	Mattagami	HEPCO	1911	1916	32	2	1,200		950	
						34	1	2,500	4,900	1,595	3,495
79	Hagues Reach	Trent	HEPCO	1925	1925	22.5	3	1,600	4,800	1,120	3,360
80	Indian Chute	Montreal	HEPCO	1923	1924	45	2	2,250	4,500	1,620	3,240
81	Sidney	Trent	HEPCO	1911	1911	20	4	1,400	5,600	795	3,180
82	Seymour	Trent	HEPCO	1909	1911	23	4	1,100		600	
							1	1,100	5,500	750	3,150
83	Mathias	Muskoka	OWLP	1950	-	47	1	3,770	3,770	2,812	2,812
84	Hound Chute	Montreal	HEPCO	1910	1911	-	4	1,335	5,340	700	2,800
85	Kapuskasing	Kapuskasing	SFPPC	1923	-	30	1	2,500	2,500	2,750	2,750
86	Frankford	Trent	HEPCO	1913	1913	18	4	1,200	4,800	650	2,600
87	Jones Falls	Rideau Canal	GELW	1948	1950	65	1	250		180	
						58	2	1,037		800	
						58	1	1,500	3,824	800	2,580
88	Nassau	Otonabee	CGEC	1902	1926	16	1	2,000		1,500	
							2	700	3,400	480	2,460
89	McVittie	Wanapitei	HEPCO	1912	1912	42	2	1,800	3,600	1,125	2,250
90	High Falls	Mississippi	HEPCO	1920	1920	82	3	1,240	3,720	700	2,100
91	Nipissing	South	HEPCO	1909	1909	-	1	1,250		1,000	
							1	1,250	2,500	1,050	2,050
92	Lakefield	Otonabee	HEPCO	1928	-	16	1	3,100	3,100	2,000	2,000
93	Fountain Falls	Montreal	HEPCO	1914	1914	30	2	1,500	3,000	1,000	2,000
94	Rideau Falls	Rideau	NRC	1909	1909	47	2	1,500	3,000	1,000	2,000
95	Sills Island	Trent	HEPCO	1926	1926	14	1	1,000		960	
							1	1,000	2,000	1,020	1,980
96	Crow Bay	Trent Canal	CPUC	1909	1911	-	1	1,470		1,125	
							1	1,000	2,470	850	1,975
97	Auburn	Otonabee	HEPCO	1911	1912	18	3	950	2,850	625	1,875
98	Current River	Current	PAPUC	1902	1906	80	2	450		350	
							1	1,200	2,100	1,150	1,850
99	Eagle	Eagle	DPC	1928	-	37	1	2,000	2,000	1,760	1,760
100	Trethewey Falls	South Muskoka	HEPCO	1929	-	35	1	2,300	2,300	1,600	1,600
Total capacity of plants under 1,500 kw.									29,826		21,858
Total capacity of turbines connected directly to mechanical equipment									27,375		
	Total (all plants)								8,399,935		6,064,241

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.

Québec

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Turbine Unit Capacity hp.	Turbine Total Capacity hp.	Generator Unit Capacity kw.	Generator Total Capacity kw.
1	Beauharnois:	St. Lawrence	QHEC								
	Section 1			1932	1948	80	8	53,000		37,300	
							6	55,000		40,000	
	Section 2			1950	1953	80	9	55,000		40,000	
							3	56,000		41,120	
	Section 3			1959	1961	80	10	73,700	2,154,000	55,250	1,574,260
2	Bersimis I	Bersimis	QHEC	1956	1958	785	8	150,000	1,200,000	114,000	912,000
3	Chute des Passes	Peribonka	ALCAN	1959	1960	540	5	200,000	1,000,000	148,500	742,500
4	Shipshaw	Saguenay	ALCAN	1942	1943	208	2	95,000		58,500	
							6	103,000		60,000	
							2	101,000		60,000	
							2	95,000	1,200,000	60,000	717,000
5	Bersimis II	Bersimis	QHEC	1959	1960	380	5	171,000	855,000	131,000	655,000
6	Carillon	Ottawa	QHEC	1962	1964	61	14	60,000	840,000	46,750	654,500
7	Manic 2	Manicouagan	QHEC	1965	1965	230	5	170,000	850,000	127,000	635,000
8	Isle Maligne	Saguenay	ALCAN	1925	1937	110	12	45,000	540,000	28,000	336,000
9	McCormick	Manicouagan	MP	1951	1965	124	2	56,200		35,625	
							3	60,000		40,000	
							2	80,000	452,400	60,000	311,250
10	Trenche	St. Maurice	QHEC	1950	1955	160	6	65,000	390,000	47,700	286,200
11	Beaumont	St. Maurice	QHEC	1958	1959	124	6	55,000	330,000	40,500	243,000
12	La Tuque	St. Maurice	QHEC	1940	1955	114	5	44,500		36,000	
							1	49,000	271,500	36,000	216,000
13	Paugan	Gatineau	QHEC	1928	1956	133	1	47,000		32,400	
						132	7	34,000	285,000	24,225	201,975
14	Chute-à-la-Savanne	Peribonka	ALCAN	1953	1953	110	5	57,000	285,000	37,450	187,250
15	Chute-du-Diable	Peribonka	ALCAN	1952	1952	110	5	55,000	275,000	37,450	187,250
16	Rapide Blanc	St. Maurice	QHEC	1934	1955	108	1	44,500		30,600	
							5	40,000	244,500	30,600	183,600
17	Chute à Caron	Saguenay	ALCAN	1931	1934	160	4	75,000	300,000	45,000	180,000
18	Shawinigan No. 2	St. Maurice	QHEC	1911	1929	146	3	43,000		30,000	
						145	3	18,500		15,000	
						145	2	18,500	221,500	14,000	163,000
19	Cedars	St. Lawrence	QHEC	1914	1924	30	12	10,800		9,000	
							6	11,300	197,400	9,000	162,000
20	Shawinigan No. 3	St. Maurice	QHEC	1948	1949	145	3	65,000	195,000	50,000	150,000
21	Grand'Mère	St. Maurice	QHEC	1915	1930	80	5	22,000		15,700	
						80	1	22,000		18,000	
						80	1	24,500		20,000	
						84	2	22,000	200,500	15,700	147,900
22	Chelsea	Gatineau	QHEC	1927	1939	93	5	34,000	170,000	28,800	144,000
23	La Gabelle	St. Maurice	QHEC	1924	1931	63	3	36,000		24,700	
						63	1	32,000		24,700	
						60	1	32,000	172,000	24,700	123,500
24	Farmers Rapids	Gatineau	QHEC	1927	1947	66	3	24,000		20,000	
							2	24,000	120,000	19,125	98,250
25	Masson	Lièvre	MQPC	1933	1933	185	4	34,000	136,000	23,800	95,200
26	Quinze Rapids	Ottawa (Upper)	QHEC	1923	1955	90	2	12,500		8,000	
							2	12,500		10,800	
							2	34,500	119,000	26,000	89,600
27	High Falls	Lièvre	MQPC	1930	1936	180	1	32,500		21,250	
							3	30,000	122,500	21,250	85,000
28	Chats Falls	Ottawa	OVPC	1932	1932	53	4	29,940	119,760	20,000	80,000

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
QUEBEC (Cont'd)											
29	Bryson	Ottawa	QHEC	1925	1949	60	2	25,700		18,000	
							1	27,000	78,400	20,000	56,000
30	Murdock Willson	Shipshaw	PBC	1957	-	263	1	82,000	82,000	51,000	51,000
31	Jim Gray	Shipshaw	PBC	1953	1953	338	2	35,000	70,000	25,500	51,000
32	Outardes Falls	Outardes	QNSPC	1937	1937	208	2	35,300	70,600	25,000	50,000
33	Fifty Foot Falls	Hart Jaune	HJP	1960	1960	123	3	22,000	66,000	16,150	48,450
34	Rapid VII	Ottawa (Upper)	QHEC	1941	1949	68	4	16,000	64,000	12,000	48,000
35	Rapid II	Ottawa (Upper)	QHEC	1954	1964	67	4	16,000	64,000	12,000	48,000
36	Montreal Island	Prairies	QHEC	1929	1930	25	6	10,000	60,000	7,500	45,000
37	Dufferin Falls	Lièvre	JMC	1958	1959	62	2	25,000	50,000	19,125	38,250
38	Chicoutimi	Chicoutimi	SMPC	1957	-	273	1	42,000	42,000	32,000	32,000
39	Hemming Falls	St. François	QHEC	1925	1925	50	6	5,600	33,600	4,800	28,800
40	Seven Falls	St. Anne (de Beaupré)	QHEC	1915	1915	410	4	6,000	24,000	4,680	18,720
41	Ste. Marguerite	Marguerite	GPC	1954	1954	100	2	12,000	24,000	8,800	17,600
42	Kipawa	Gordon Creek	QHEC	1920	1926	200	2	3,600		2,800	
							2	8,500	24,200	5,760	17,120
43	Chaudière No. 2	Ottawa	QHEC	1920	1923	32	2	7,500		5,400	
							1	7,500	22,500	5,760	16,560
44	St. Narcisse	Batiscan	QHEC	1926	1926	147	2	11,100	22,200	7,500	15,000
45	Drummondville	St. François	QHEC	1910	1925	30	2	3,200		2,500	
							2	6,000	18,400	4,800	14,600
46	Chutes aux Galets	Shipshaw	PBC	1921	1921	101	2	8,820	17,640	6,800	13,600
47	Chaudière Falls	Ottawa	EBEC	1913	1955	38	3	5,500	16,500	3,750	11,250
48	Chicoutimi	Chicoutimi	PBC	1923	-	72	1	11,000	11,000	9,900	9,900
49	Waltham	Black	PELC	1917	1951	129	1	1,800		1,250	
							1	2,250		1,530	
							1	2,500		1,800	
							2	3,000	12,550	2,250	9,080
50	Chaudière No. 1	Ottawa	QHEC	1902	1912	38	3	2,500		1,275	
							1	3,300		1,700	
							1	3,300	14,100	2,125	7,650
51	Buckingham	Lièvre	ERC	1914	1939	30	1	2,000		1,375	
							1	2,500		1,836	
							3	2,000	10,500	1,440	7,531
52	Price	Mitis	QHEC	1922	1929	128	1	3,700		2,400	
						120	1	5,900	9,600	4,000	6,400
53	Adam Cunningham	Shipshaw	PBC	1953	-	56	1	9,500	9,500	6,375	6,375
54	Arnaud Bridge	Chicoutimi	QHEC	1923	1923	56	1	2,500		1,700	
							2	2,500	7,500	1,875	5,450
55	Bell Falls	Rouge	QHEC	1915	1920	54	3	2,400	7,200	1,600	4,800
56	Kenogami	Au Sable	PBC	1912	1912	264	2	3,350	6,700	2,345	4,690
57	Grand Mitis No. 2	Mitis	QHEC	1947	-	75	1	6,000	6,000	4,250	4,250
58	Jonquière	Au Sable	MJ	1907	1924	42	1	1,800		1,280	
						47	1	4,030	5,830	2,812	4,092
59	Westbury	St. François	CS	1928	1928	28	2	2,900	5,800	2,000	4,000
60	Lachute	North	AL	1929	1929	36	3	1,500	4,500	1,080	3,240

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
QUEBEC (Cont'd)											
61	Windsor Mills	St. François	DPP	1936	1939	19	2	1,500		1,120	
							1	800		600	
							1	430	4,230	320	3,160
62	Weedon	St. François	CS	1920	1926	30	2	1,700		1,040	
						29	1	1,700	5,100	1,040	3,120
63	St. Alban	Ste. Anne de la Pérade	QHEC	1927	-	64	1	4,000	4,000	3,000	3,000
64	St. Raphael	Sud	QHEC	1921	1921	232	3	1,500	4,500	850	2,550
65	Garneau Falls	Chicoutimi	QHEC	1928	-	30	1	3,500	3,500	2,520	2,520
66	Chaudière	Chaudière	QHEC	1900	1903	114	2	1,400		750	
							1	2,000	4,800	1,000	2,500
67	Domtar	Jacques Cartier	DT	1960	1962	60	2	1,200	2,400	1,200	2,400
68	MacDougall Falls	Jacques Cartier	DP	1925	1927	50	2	1,900	3,800	1,200	2,400
69	Jonquière Mill	Au Sable	PBC	1916	1916	67	1	1,800		1,200	
							1	1,625	3,425	1,200	2,400
70	Winneway	Winneway (Upper Ottawa)	LMC	1938	1943	57	2	1,400	2,800	1,169	2,338
71	Ogilvie Flour Mills	Lachine Canal	OFM	1940	1948	23	2	1,600		850	
						15	2	400	4,000	300	2,300
72	Mont Laurier	Lièvre	EML	1937	1951	22	1	500		500	
							2	1,325	3,150	900	2,300
73	Sherbrooke	Magog	QHEC	1910	1910	57	3	1,333	4,000	752	2,256
74	Magpie	Magpie	QHEC	1961	1961	27	2	1,500	3,000	1,000	2,000
75	Magog	Magog	DTC	1920	1920	25	2	1,500	3,000	1,000	2,000
76	Corbeau	Gatineau	QHEC	1926	1926	12	2	1,250	2,500	1,000	2,000
77	Bird's Mill Falls	Jacques Cartier	DP	1937	-	27	1	2,250	2,250	1,920	1,920
78	Rock Forest	Magog	CS	1911	1911	30	2	1,500	3,000	940	1,880
79	Rivière-du-Loup	Du Loup	CRL	1929	1942	100	1	960		640	
							1	1,800	2,760	1,200	1,840
80	Rawdon	Ouareau	QHEC	1927	-	50	1	2,300	2,300	1,720	1,720
81	Frontenac	Magog	CS	1917	1917	38	2	1,450	2,900	800	1,600
82	Burroughs Falls	Nigger	QHEC	1929	-	175	1	2,000	2,000	1,600	1,600
83	Natural Steps	Montmorency	QHEC	1908	-	60	1	2,225	2,225	1,500	1,500
Total capacity of plants under 1,500 kw.									40,593		28,138
Total capacity of turbines connected directly to mechanical equipment									59,365		
Total (all plants)									14,382,478		10,339,085

No.	Development	River	Owner	Year Installed		Rated Head ft.	No. of Units	Turbines		Generators	
				First Unit	Latest Unit			Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.

New Brunswick

No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Beechwood	Saint John	NBEPC	1957	1962	57	2	45,000		36,000	
							1	55,000	145,000	40,500	112,500
2	Grand Falls	Saint John	NBEPC	1928	1931	125	4	20,000	80,000	15,750	63,000
3	Tinker	Aroostook	MNBP	1906	1965	85	2	2,000		1,500	
							2	5,000		3,520	
							1	33,000	47,000	20,800	30,840
4	Tobique	Tobique	NBEPC	1953	1953	75	2	13,500	27,000	10,000	20,000
5	Bathurst	Nepisiguit	BPPC	1921	1929	108	2	5,000		3,600	
						110	1	5,000	15,500	3,600	10,800
6	Sisson	Tobique	NBEPC	1965	1965	135	1	12,500	12,500	10,000	10,000
7	Musquash	Musquash	NBEPC	1920	1920	99.5	2	3,670		2,320	
						124.5	1	3,760	11,100	2,320	6,960
8	Milltown	St. Croix	NBEPC	1911	1962	21	3	1,080		770	
						25	1	500		376	
							1	468	4,208	350	3,036
9	Edmundston	Madawaska	FC	1918	1918	21.1	2	1,030	2,060	1,000	2,000
	Total capacity of plants under 1,500 kw.								3,025		2,500
	Total capacity of turbines connected directly to mechanical equipment								5,000		
	Total (all plants)								352,393		261,636

Nova Scotia

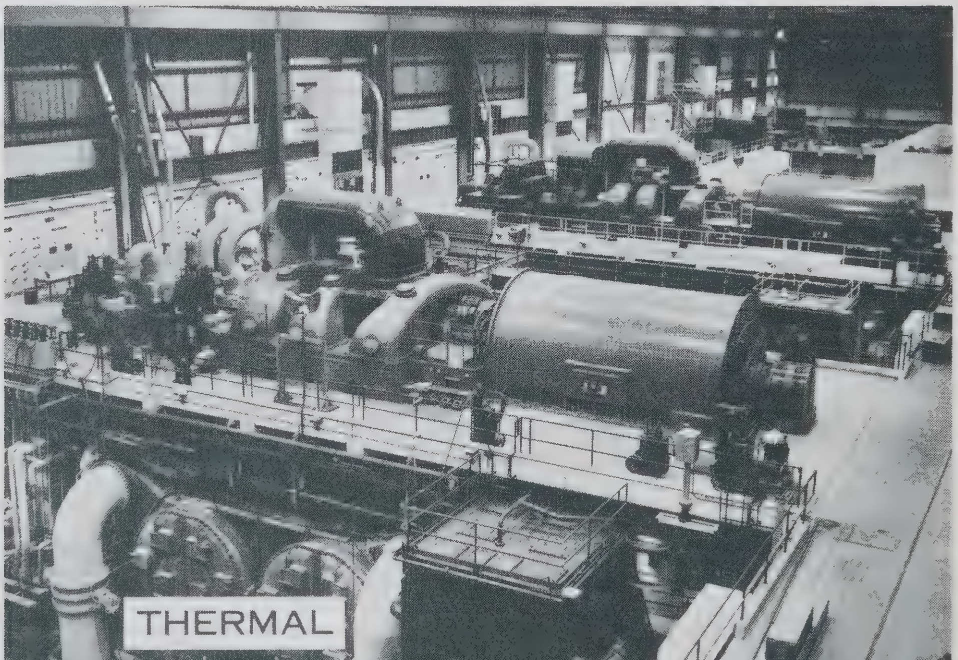
No.	Development	River	Owner	First Unit	Latest Unit	Rated Head ft.	No. of Units	Unit Capacity hp.	Total Capacity hp.	Unit Capacity kw.	Total Capacity kw.
1	Deep Brook	Mersey	NSPC	1950	1950	46	2	6,400	12,800	4,500	9,000
2	Big Falls	Mersey	NSPC	1929	1929	58	2	6,350	12,700	4,500	9,000
3	Weymouth Falls	Sissiboo	NSPC	1960	-	122	1	12,000	12,000	9,000	9,000
4	Lower Lake Falls	Mersey	NSPC	1929	1929	48.5	2	5,300	10,600	3,690	7,380
5	Cowie Falls	Mersey	NSPC	1937	1937	43	2	5,100	10,200	3,600	7,200
6	Ruth Falls	East, Sheet Harbour	NSPC	1927	1936	110	2	3,290		2,000	
						109	1	4,300	10,880	2,970	6,970
7	Hells Gates	Black	NSLPC	1930	1949	185	1	4,500		3,360	
							1	4,500	9,000	3,570	6,930

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
NOVA SCOTIA (Cont'd)											
8	Nictaux	Nictaux	NSLPC	1954	-	382	1	9,000	9,000	6,800	6,800
9	Gulch	Bear	NSPC	1956	-	225	1	8,500	8,500	6,000	6,000
10	Sissiboo Falls	Sissiboo	NSPC	1960	-	87	1	8,000	8,000	6,000	6,000
11	Upper Lake Falls	Mersey	NSPC	1929	1929	31.5	2	3,000	6,000	2,700	5,400
12	Hollow Bridge	Black	NSLPC	1940	-	148	1	7,500	7,500	5,312	5,312
13	Tidewater	North East	NSPC	1921	1921	91.5	2	3,450	6,900	2,320	4,640
14	Lower Great Brook	Mersey	NSPC	1955	1955	22	2	3,120	6,240	2,250	4,500
15	Ridge	Bear	NSPC	1957	-	140	1	5,300	5,300	4,000	4,000
16	Dickie Brook	Dickie Brook	NSPC	1948	1948	298	1 1	1,750 1,750	3,500	1,200 2,600	3,800
17	Avon No. 1	Avon	NSLPC	1958	-	117.5	1	5,000	5,000	3,750	3,750
18	Malay Falls	East, Sheet Harbour	NSPC	1924	1954	43 41	2 1	1,850 1,740	5,440	1,200 1,200	3,600
19	Paradise	Paradise Brook	NSLPC	1950	-	465	1	5,000	5,000	3,600	3,600
20	Methal's	Methal's Brook	NSLPC	1949	-	45	1	4,600	4,600	3,400	3,400
21	Sandy Lake	North East	NSPC	1927	1927	118	2	2,500	5,000	1,600	3,200
22	White Rock	Gasperaux	NSLPC	1952	-	58	1	4,000	4,000	3,200	3,200
23	St. Croix	St. Croix	MBPP	1934	-	148	1	4,200	4,200	3,000	3,000
24	Avon No. 2	Avon	NSLPC	1929	-	142	1	3,900	3,900	3,000	3,000
25	Lumsden	Black	NSLPC	1942	-	72	1	4,500	4,500	2,800	2,800
26	Mill Lake	North East	NSPC	1921	1921	162.5	2	1,900	3,800	1,280	2,560
27	Tusket	Tusket	NSPC	1929	1929	18	3	940	2,820	720	2,160
28	Salmon Hole	St. Croix	MBPP	1938	-	75	1	2,500	2,500	2,000	2,000
Total capacity of plants under 1,500 kw.									6,550		4,708
Total capacity of turbines connected directly to mechanical equipment											
Total (all plants)									196,430		142,910

Newfoundland

No.	Development	River	Owner	Year Installed First Unit	Year Installed Latest Unit	Rated Head ft.	No. of Units	Turbines Unit Capacity hp.	Turbines Total Capacity hp.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Twin Falls	Unknown	TFPC	1962	1963	290	4	60,000	240,000	46,800	187,200
2	Deer Lake	Humber	BPC	1925	1930	247	1	14,000		9,750	
							6	16,000		12,000	
							2	29,000	168,000	20,000	121,750
3	Grand Falls	Exploits	PPP	1909	1938	109	3	2,500		1,500	
							1	36,000	43,500	22,000	26,500
4	Menihek	Ashuanipi (Labrador)	IOCC	1954	1960	34	2	6,000		4,250	
						40	1	13,500	25,500	10,200	18,700
5	Bishops Falls	Exploits	PPP	1909	1952	35	7	2,700		2,025	
							2	1,700	22,300	1,500	17,175
6	Rattling Brook	Rattling Brook	NLPC	1958	1958	307	2	8,500	17,000	6,750	13,500
7	Mobile	Mobile	NLPC	1951	-	370	1	13,000	13,000	9,350	9,350
8	Watson's Brook	Corner Brook	BPC	1958	1958	559	2	6,000	12,000	4,600	9,200
9	Horse Chops	Horse Chops	NLPC	1953	-	276	1	10,000	10,000	7,650	7,650
10	Tors Cove	Tors Cove	NLPC	1942	1951	173	2	2,850		2,000	
							1	3,550	9,250	2,500	6,500
11	Cape Broyle	Horse Chops	NLPC	1952	-	176	1	7,600	7,600	6,000	6,000
12	Sandy Brook	Sandy Brook	NLPC	1963	-	115	1	8,000	8,000	5,950	5,950
13	Lookout Brook	Lookout Brook	WCPC	1945	1958	575	2	1,850		1,400	
							1	3,600	7,300	2,400	5,200
14	Petty Harbour	Petty Harbour	NLPC	1908	1926	190	2	2,100		1,600	
							1	2,750	6,950	1,800	5,000
15	New Chelsea	New Chelsea Brook	UTEC	1957	-	275	1	5,600	5,600	4,000	4,000
16	Seal Cove	Seal Cove	UTEC	1922	1927	190	1	1,500		1,200	
							1	3,040	4,540	2,400	3,600
17	Pierres Brook	Pierres Brook	NLPC	1931	-	263	1	4,500	4,500	3,200	3,200
18	Rocky Pond	Tors Cove	NLPC	1943	-	107	1	4,200	4,200	3,200	3,200
19	Lockston	Lockston	UELPC	1956	1961	270	2	2,000	4,000	1,480	2,960
20	Hearts Content	Hearts Content Brook	UTEC	1960	-	150	1	3,600	3,600	2,400	2,400
21	Buchans Brook	Buchans Brook	ASRC	1927	-	163	1	2,359	2,359	1,760	1,760
	Total capacity of plants under 1,500 kw.								7,690		5,440
	Total capacity of turbines connected directly to mechanical equipment								22,000		
	Total (all plants)								648,889		466,235

Canada (TOTAL HYDRO CAPACITY) 21,791,969


THERMAL

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.

British Columbia

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Burrard	Vancouver	BCHPA	1962	1965	Gas, oil	S	3	150,000	450,000
2	Port Mann	New Westminster	BCHPA	1959	1959	Oil	GT	4	25,000	100,000
3	Georgia	Chemainus	BCHPA	1958	1959	Oil	GT	2	19,750	
								2	18,000	75,500
4	Harmac	Nanaimo	MBPR	1954	1963	Oil,	S	1	31,500	
						wood-		1	4,000	
						waste		1	1,250	36,750
5	Prince George	Prince George	BCHPA	1957	1963	Gas, oil	GT	1	6,000	
							IC	7	3,000	27,000
6	Somass Mill	Port Alberni	MBPR	1963	-	Wood-waste	S	1	26,000	26,000
7	Chetwynd	Chetwynd	BCHPA	1958	1965	Gas, oil	IC	2	600	
								1	800	
								1	1,000	
								4	3,000	
							GT	1	6,000	21,000
8	Dawson Creek	Dawson Creek	BCHPA	1953	1963	Gas, oil	IC	2	1,000	
								6	3,000	20,000
9	Port Alice	Port Alice	RC	1942	1957	Oil,	S	1	3,200	
						wood-		2	3,500	
						waste		1	6,000	16,200
10	Watson Island	Watson Island	CCC	1950	1950	Oil, wood-waste	S	2	7,500	15,000
11	Powell River	Powell River	MBPR	1948	1960	Wood-	S	1	1,350	
						waste,		1	1,200	
						oil		1	10,500	
								1	1,875	14,925
12	Ocean Falls	Ocean Falls	CZC	1930	1950	Oil,	S	1	3,000	
						wood-		1	2,000	
						waste		1	4,000	
								1	5,000	14,000
13	New Westminster	New Westminster	CZB	1912	1950	Wood-	S	1	5,000	
						waste		1	1,500	
								1	6,000	12,500
14	Eburne Sawmills	Vancouver	CFP	1960	1960	Wood-waste	S	2	5,750	11,500
15	Kitimat	Kitimat	ALCAN	1954	1959	Oil	IC	8	1,000	8,000
16	Taylor	Taylor	PP	1957	1957	Gas	S	3	2,500	7,500
17	Kelowna	Kelowna	SMS	1950	1963	Wood-	S	1	750	
						waste,		1	2,000	
						oil, coal		1	3,500	
								1	1,000	7,250
18	Woodfibre	Woodfibre	RC	1948	1961	Oil,	S	2	2,000	
						wood-waste		1	3,000	7,000
19	Smithers	Smithers	BCHPA	1951	1965	Oil	IC	2	560	
								1	760	
								2	1,000	
								1	3,000	6,880
20	Dry Dock	Prince Rupert	BCHPA	1950	1963	Oil	IC	3	800	
								1	1,970	
								1	2,034	6,404

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
BRITISH COLUMBIA (Cont'd)										
21	Mica Creek	Mica	BCHPA	1965	1965	Oil	IC	1 2 1	675 1,000 2,500	5,175
22	Port Mellon	Port Mellon	CFP	1928	1947	Oil	S	1 1 1	500 1,500 3,000	5,000
23	Semi-mobile unit No. 87	-	BCHPA	1965	-	Oil	IC	1	5,000	5,000
24	Vancouver	Vancouver	MBPR	1949	1956	Wood-waste	S	1 1	750 4,000	4,750
25	Kimberley (Stand-by)	Kimberley	CMSC	1927	1928	Coal	S	3	1,500	4,500
26	Kamloops	Kamloops	BCHPA	1953	1953	Gas, oil	IC	2 1	1,000 2,500	4,500
27	Victoria	Victoria	BCFP	1940	1950	Wood-waste, oil	S	1 1	3,000 1,500	4,500
28	Youbou	Youbou	BCFP	1929	1958	Wood-waste	S	1 2 1	800 750 2,000	4,300
29	Burns Lake	Burns Lake	BCHPA	1954	1965	Oil	IC	1 4 2	800 250 1,136	4,072
30	Hammond	Hammond	BCFP	1928	1929	Wood-waste	S	2	2,000	4,000
31	Chemainus	Chemainus	MBPR	1925	1950	Wood-waste, oil	S	1 1	3,000 750	3,750
32	Vancouver	Vancouver	BCSRC	1947	1960	Gas, oil	S	3	1,250	3,750
33	Cassiar	Cassiar	CAC	1952	1964	Oil	IC	3 2 1 1 1	300 350 450 650 973	3,673
34	Hazelton	Hazelton	BCHPA	1965	1965	Oil	IC	3 2 1 1	700 600 250 100	3,650
35	Jedway	Jedway	JIOC	-	-	Oil	IC	3 1	1,004 225	3,237
36	Fort Nelson	Fort Nelson	BCHPA	1960	1960	Oil, gas	IC	1 1 1 1 1	1,200 600 261 100 1,000	3,161
37	Honeymoon Bay	Honeymoon Bay	WFI	1949	1961	Oil	S	1 1	1,000 2,000	3,000
38	Port Hardy	Port Hardy	BCHPA	1959	1965	Oil	IC	1 1 2 1	600 500 300 1,000	2,700
39	Mesachie Lake	Mesachie Lake	HLC	1943	1949	Wood-waste	S	1 1 1	1,600 750 260	2,610
40	Endako	Endako	EM	1964	1964	Oil	IC	1 1	1,250 1,000	2,250

No.	Station	Location	Owner	Year Installed: First Unit	Year Installed: Latest Unit	Fuel	Type of Prime Mover	Generators: No.	Generators: Unit Capacity kw.	Generators: Total Capacity kw.
BRITISH COLUMBIA (Cont'd)										
41	Revelstoke	Revelstoke	COR	1926	1954	Oil	IC	2	300	
								1	400	
								1	1,000	2,000
42	Wells	Wells	CGQM	1936	1955	Oil	IC	1	350	
								2	300	
								1	125	
								2	250	
								2	150	1,875
43	Tide Camp	Stewart	GM	1965	1965	Oil	IC	2	500	
								2	400	1,800
44	Giscome	Giscome	ELS	1951	1956	Wood-waste, oil	S	1	1,500	
							IC	1	300	1,800
45	McBride	McBride	BCHPA	1951	1957	Oil, gas	IC	3	600	1,800
46	Vanderhoof	Vanderhoof	BCHPA	1953	1955	Oil	IC	1	600	
								1	1,000	1,600
	Total capacity of plants 1,500 kw. and over (not listed above)									7,500
	Total capacity of plants under 1,500 kw.									41,075
	Total (all plants)									1,020,437

Northwest Territories

No.	Station	Location	Owner	Year Installed: First Unit	Year Installed: Latest Unit	Fuel	Type of Prime Mover	Generators: No.	Generators: Unit Capacity kw.	Generators: Total Capacity kw.
1	Port Radium	Port Radium	EMR	1936	1953	Oil	IC	2	150	
								1	864	
								2	650	
								2	400	
								1	175	
								1	200	3,639
2	Frobisher Bay	Frobisher Bay	NCPC	1963	1963	Oil	IC	1	1,000	
								1	960	
							GT	1	1,500	3,460
3	Inuvik	Inuvik	NCPC	1957	1963	Oil	IC	2	375	
								1	150	
								1	960	
								1	1,000	
							S	1	600	3,460
4	Fort Smith	Fort Smith	NCPC	1955	1962	Oil	IC	1	280	
								1	600	
								1	1,000	
								1	392	
								1	960	3,232
5	Hay River	Hay River	NU					1	275	
								1	300	
								1	650	
								1	500	1,725
6	Tungsten	Tungsten	CTMC	1962	1962	Oil	IC	3	500	1,500
	Total capacity of plants 1,500 kw. and over (not listed above)									-
	Total capacity of plants under 1,500 kw.									9,412
	Total (all plants)									26,428

Yukon Territory

Total capacity of plants 1,500 kw. and over (not listed above)	-
Total capacity of plants under 1,500 kw.	3,910
Total (all plants)	3,910

GT - Gas Turbine, IC - Internal Combustion, S - Steam

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.

Alberta

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Edmonton	Edmonton	CE	1939	1963	Gas, oil	S	2	15,000	
								3	30,000	
								2	75,000	
							GT	2	30,000	330,000
2	Wabamun	Wabamun	CP	1956	1962	Gas,	S	2	66,000	
						coal		1	150,000	282,000
3	Battle River	Forestburg	CU	1956	1964	Coal, oil	S	2	33,000	66,000
4	Vermilion	Vermilion	CU	1948	1961	Gas	S	4	2,250	
							GT	1	30,000	39,000
5	Medicine Hat	Medicine Hat	CMH	1929	1953	Gas	S	1	3,000	
								1	5,000	
								1	30,000	38,000
6	Lethbridge	Lethbridge	CL	1931	1961	Gas	S	1	3,375	
								2	5,000	
							GT	2	10,000	33,375
7	Hinton	Hinton	NWPP	1956	1957	Gas,	S	1	20,000	
						wood-	IC	1	1,100	
						waste,		1	1,000	22,100
						oil				
8	Sturgeon	Valleyview	CU	1958	1961	Flare	GT	1	10,000	
						gas		1	8,500	18,500
9	Clover Bar	Edmonton	CCCL	1953	1953	Gas	S	3	6,000	18,000
10	Drumheller	Drumheller	CU	1928	1952	Coal	S	2	7,500	
								1	2,500	17,500
11	Duvernay	Duvernay	WC	1953	1958	Gas	S	3	300	
								1	1,200	
							IC	6	500	
							GT	1	8,437	13,537
12	Fairview	Fairview	CU	1954	1960	Gas	IC	1	1,200	
			NU					3	3,000	
			NU					1	1,200	11,400
13	Sentinel	Coleman	EKPC	1927	1929	Coal	S	2	5,000	10,000
14	Edmonton	University	DPW	1960	1963	Gas	GT	1	2,200	
							S	1	5,000	
							S	1	2,000	9,200
15	Fort Saskatchewan	Fort Saskatchewan	SGM	1954	1959	Gas	S	2	2,500	5,000
16	Whitecourt	Whitecourt	PAPC	1958	1964	Gas	IC	2	300	
								5	800	4,600
17	Rimbey	Rimbey	BA	1960	1963	Gas	S	4	1,000	4,000
18	Grande Prairie	Grande Prairie	CU	1948	1955	Gas, oil	IC	1	800	
								1	600	
								1	2,500	3,900
19	Taber	Taber	CSF	1950	1960	Gas, oil	S	1	2,000	
								1	1,675	3,675
20	Jasper	Jasper	NU	1941	1964	Oil	IC	1	1,200	
								1	474	
								1	96	
								1	500	
								1	300	2,570

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
ALBERTA (Cont'd)										
21	Edmonton	Legislative Bldg.	DPW	1953	1965	Gas	S	2 1	800 500	2,100
22	Picture Butte	Picture Butte	CSF		1964	Gas	S	1 1	1,250 750	2,000
23	Athabasca	Athabasca	CP	1953	1961	Gas	IC	1 2	1,200 300	1,800
24	Fort McMurray	Fort McMurray	FMP		1964	Oil	IC	1 2 1 1 1	500 350 225 150 100	1,675
25	Edmonton	Alberta Hospital	DPW	1929	1954	Gas	S	1 1 1 1	600 500 300 200	1,600
26	Worsley	Worsley	NU	1963	1963		IC	1 1	864 650	1,514
Total capacity of plants 1,500 kw. and over (not listed above)										4,000
Total capacity of plants under 1,500 kw.										11,918
Total (all plants)										959,064

Saskatchewan

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Boundary Dam	Estevan	SPC	1959	1960	Coal	S	2	66,000	132,000
2	Queen Elizabeth	Saskatoon	SPC	1958	1959	Gas, oil, coal	S	2	66,000	132,000
3	A.L. Cole	Saskatoon	SPC	1929	1957	Coal, oil, gas	S	1 1 2 1	10,000 15,000 25,000 30,000	105,000
4	Regina	Regina	SPC	1925	1960	Oil, gas	S GT	1 1 1 1 1	15,000 5,000 20,000 30,000 23,360	93,360
5	Estevan	Estevan	SPC	1929	1957	Coal, gas	S	1 1 1 1	5,000 15,000 20,000 30,000	70,000
6	Kindersley	Kindersley	SPC	1955	1958	Gas	IC GT	3 2	3,000 10,000	29,000
7	Moose Jaw	Moose Jaw	SPC	1930	1952	Oil, gas	S	1 1	10,000 15,000	25,000
8	Kalium	Kalium	KC	1964	1964	Gas	S	2	7,500	15,000

No.	Station	Location	Owner	Year Installed First Unit	Year Installed Latest Unit	Fuel	Type of Prime Mover	Generators No.	Generators Unit Capacity kw.	Generators Total Capacity kw.
SASKATCHEWAN (Cont'd)										
9	Swift Current	Swift Current	SPC	1954	1957	Oil	IC	2 4	1,275 3,000	14,550
10	Eldorado	Eldorado	EMR	1952	1956	Resid-ual oil	IC	2 2 4	392 382 2,250	10,548
11	Flin Flon	Flin Flon (Saskatchewan)	HBMS	1929	1951	Coal, oil	S	1 1	1,000 6,000	7,000
	Total capacity of plants 1,500 kw. and over (not listed above)									10,000
	Total capacity of plants under 1,500 kw.									4,143
	Total (all plants)									647.601

Manitoba

No.	Station	Location	Owner	Year Installed First Unit	Year Installed Latest Unit	Fuel	Type of Prime Mover	Generators No.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Brandon	Brandon	MH	1957	1958	Coal, gas, oil	S	4	33,000	132,000
2	Selkirk	Selkirk	MH	1960	1960	Coal, oil	S	2	66,000	132,000
3	Amy Street	Winnipeg	WH	1924	1954	Coal	S	2 1 1	5,000 15,000 25,000	50,000
4	The Pas	The Pas	MH	1948	1962	Oil	IC	1 3 1 1	1,100 1,000 750 400	5,250
5	Churchill	Churchill	NHB	1931	1955	Grain refuse,	S	2 1	1,500 600	
						oil, coal	IC	1 1	200 250	4,050
6	Fort Garry	Winnipeg	MSC	1940	1953	Oil	S	1 1	1,500 2,500	4,000
7	Thompson	Thompson	INCO		1958	Oil	IC	2	1,500	3,000
8	Grand Rapids	Grand Rapids	MH	1961	1963	Oil	IC	1 1 1	1,000 350 150	1,500
	Total capacity of plants 1,500 kw. and over (not listed above)									4,000
	Total capacity of plants under 1,500 kw.									3,016
	Total (all plants)									338,816

GT - Gas Turbine, IC - Internal Combustion, S - Steam

Ontario

No.	Station	Location	Owner	Year Installed First Unit	Year Installed Latest Unit	Fuel	Type of Prime Mover	Generators No.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Richard L. Hearn	Toronto	HEPCO	1951	1961	Coal	S	4 4	100,000 200,000	1,200,000
2	Lakeview	Toronto	HEPCO	1961	1965	Coal	S	4	300,000	1,200,000
3	J. Clark Keith	Windsor	HEPCO	1951	1953	Coal	S	4	66,000	264,000
4	Thunder Bay	Fort William	HEPCO	1963	-	Coal	S	1	100,000	100,000
5	Windsor	Windsor	FMCC	1936	1952	Coal	S	1 1 2	10,000 4,000 25,000	64,000
6	A. W. Manby	Toronto	HEPCO	1965	1965	Oil	GT	2	16,320	32,640
7	Sarnia	Sarnia	PC	1943	1956	Coal, oil	S	1 1 1 1	10,000 5,000 4,000 13,280	32,280
8	Sarnia-Scott	Sarnia	HEPCO	1965	1965	Oil	GT	2	15,000	30,000
9	Fort William	Fort William	GLPC	1928		Gas, coal, wood-waste	S	1 1 1	4,000 5,000 17,100	26,100
10	Sault Ste. Marie	Sault Ste. Marie	ASC	1942	1963	Gas, oil, coal	S	2 2	12,500 500	26,000
11	Kapuskasing	Kapuskasing	SFPPC	1928	1958	Coal, gas, wood-waste	S	2 1 1	650 12,500 9,100	22,900
12	Nuclear Power Demonstration Unit	Rolphton	AECL	1962	-	Uranium dioxide	S	1	20,000	20,000
13	Marathon	Marathon	MCC	1946	1948	Coal, oil	S	1 2	7,500 4,000	15,500
14	Hamilton	Hamilton	SCC	1948	1959	Coke-oven gas, oil	S	1 1	4,000 6,000	10,000
15	Amherstburg	Amherstburg	BRMC	1938	1957	Coal	S	1 1 1	2,500 2,000 3,750	8,250
16	Thorold	Thorold	OPC	1937	1937	Coal, gas	S	2	4,000	8,000

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
ONTARIO (Cont'd)										
17	Dryden	Dryden	DPC	1954	-	Coal, gas	S	1	6,000	6,000
18	Walkerville	Walkerville	HWS	1924	1955	Coal	S	2 1 1	1,000 2,500 625	5,125
19	Sault Ste. Marie	Sault Ste. Marie	APPC	1927	-	Coal, gas, wood-waste	S	1	3,500	3,500
20	Strathcona	Strathcona	SP	1955	1955	Coal	S	2	1,655	3,310
21	Chatham	Chatham	CDSC	1946	1946	Coal	S	2	1,500	3,000
22	Fort Frances	Fort Frances	OMPP	1927	-	Coal	S	1	3,000	3,000
23	Blind River	Blind River	MFLC	1927	1927	Wood-waste	S	1 1	750 2,000	2,750
24	Station No. 6	Gananoque	GELW	1959	1959	Gas	IC	2	1,360	2,720
25	Toronto	Toronto	CDSC	1959	-	Coal, gas, oil	S	1	2,500	2,500
26	Toronto	Toronto	CCCC	1937	-	Coal, oil	S	1	2,500	2,500
27	Ottawa	Ottawa	EBEC	1923	-	Coal	S	1	2,500	2,500
28	Port Arthur	Port Arthur	APPC	1928	-	Coal, wood-waste, gas	S	1	2,500	2,500
29	New Toronto	New Toronto	GTR	1940	-	Coal, oil	S	1	2,500	2,500
30	Pembroke	Pembroke	PELC	1929	1949	Oil	IC	1 2	933 680	2,293
31	Orillia	Orillia	OWLP	1947	1948	Oil	IC	1 1	1,000 1,136	2,136
32	Peterborough	Peterborough	CGEC	1930	1949	Coal	S	1	2,000	2,000
33	Espanola	Espanola	KVPC	1947	1951	Coal	S	1	2,000	2,000
Total capacity of plants 1,500 kw. and over (not listed above)										94,450
Total capacity of plants under 1,500 kw.										12,840
Total (all plants)										3,217,294

GT - Gas Turbine, IC - Internal Combustion, S - Steam

Québec

No.	Station	Location	Owner	Year Installed First Unit	Year Installed Latest Unit	Fuel	Type of Prime Mover	Generators No.	Generators Unit Capacity kw.	Generators Total Capacity kw.
1	Tracy	Tracy	QHEC	1964	-	Oil	S	2	150,000	300,000
2	Les Boules	Les Boules	QHEC	1955	1960	Oil	GT	6	6,000	36,000
3	Chandler	Chandler	GPP	1930	1954	Oil	S	1 1 1	6,000 2,500 4,000	12,500
4	Noranda	Noranda	NM	1934	1957	Waste heat	S	1 1 1	2,600 3,000 4,500	10,100
5	Drummondville	Drummondville	CCL	1935	1953	Coal, oil	S	1 1 1 1	1,500 2,500 3,500 2,000	9,500
6	Murdochville	Murdochville	GCM	1952	1955	Oil, waste heat	S IC	1 2 1	5,400 1,000 300	7,700
7	Thurso	Thurso	TPPC	1957	-	Coal, oil, wood-waste	S	1	7,500	7,500
8	Quebec City	Quebec City	ACPP	1927	-	Oil	S	1	7,500	7,500
9	Cap aux Meules	Îles-de-la-Madeleine	QHEC	1953	1964	Oil	IC	2 1 1 1 1	250 400 1,065 1,000 1,100	4,065
10	Magog	Magog	DTC	1938	1948	Coal	S	2	2,000	4,000
11	Gatineau	Gatineau	CIPC	1927	1927	Coal	S	4	900	3,600
12	Montreal	Montreal	CDSC	1925	1947	Gas, oil	S	2 1	1,000 1,500	3,500
13	Port and Terminal (Stand-by)	Port Cartier	QCMC	1960	1960	Oil	IC	3 1	1,000 350	3,350
14	Lac Jeannine (Stand-by)	Gagnon	QCMC	1960	1960	Oil	IC	3 2	350 1,000	3,050
15	Schefferville	Schefferville	IOCC	1956	1956	Oil	IC	3	1,000	3,000
16	Three Rivers	Three Rivers	CIPC	1922	1925	Coal, oil, wood-waste	S	6	500	3,000
17	Beaupré	Beaupré	SAPC	1927	1927	Coal	S	2 2	750 650	2,800
18	Havre St. Pierre	Havre St. Pierre	REC	1950	1963	Oil	IC	1 1 3	1,000 500 300	2,400
19	Rivière-du-Loup	Rivière-du-Loup	CRL	1947	1953	Oil	IC	2 1	240 1,360	1,840

Total capacity of plants 1,500 kw. and over (not listed above)	11,150
Total capacity of plants under 1,500 kw.	10,112
Total (all plants)	446,667

GT - Gas Turbine, IC - Internal Combustion, S - Steam

No.	Station	Location	Owner	Year Installed First Unit	Year Installed Latest Unit	Fuel	Type of Prime Mover	Generators No.	Generators Unit Capacity kw.	Generators Total Capacity kw.

New Brunswick

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Grand Lake No. 2	Newcastle Creek	NBEPC	1951	1963	Coal	S	2 1 1	5,000 15,000 60,000	85,000
2	Courtenay Bay	East Saint John	NBEPC	1961	1965	Oil	S	1 1	50,000 13,365	63,365
3	Chatham	Chatham	NBEPC	1948	1956	Coal, oil	S	1 1	12,500 20,000	32,500
4	Lancaster	Lancaster	IPP	1947	1960	Oil	S	1 1 1	2,000 10,000 12,500	24,500
5	Bathurst	Bathurst	BPPC	1937	1958	Coal, oil	S	1 1 1	6,000 7,600 7,000	20,600
6	Edmundston	Edmundston	FC	1949	1958	Coal, wood-waste	S	1 1 1	3,000 3,800 12,500	19,300
7	Grand Lake No. 1	Newcastle Creek	NBEPC	1931	1944	Coal	S	1 1 1	2,500 6,250 7,500	16,250
8	Dock Street	Saint John	NBEPC	1929	1947	Coal, oil	S	1 1	6,000 10,000	16,000
9	Dalhousie	Dalhousie	NBIPC	1929	1937	Coal	S	1 1	6,000 8,000	14,000
10	Atholville	Atholville	FC	1929	1956	Coal, wood-waste	S	4 1 1	1,000 2,000 5,000	11,000
11	Newcastle	Newcastle	FC	1949	1949	Coal	S	1 1	2,000 2,500	4,500
12	Saint John	Saint John	ASR	1954	1962	Oil	S	1 1	2,500 1,000	3,500
13	Edmundston	Edmundston	ME	1947	1955	Oil	IC	2 1	690 1,876	3,256
14	Campbellton	Campbellton	CC	1946	1953	Oil	IC	1 1 1	240 1,136 1,360	2,736
15	Grand Manan	Grand Manan	NBEPC	1957	1965	Oil	IC	1 1 1 1	200 250 700 500	1,650
	Total capacity of plants 1,500 kw. and over (not listed above)									-
	Total capacity of plants under 1,500 kw.									2,100
	Total (all plants)									320,257

Nova Scotia

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Lower Water Street	Halifax	NSLPC	1944	1959	Coal, oil	S	1 2 1 2	12,500 20,000 25,000 45,000	167,500
2	Tufts Cove	Tufts Cove	NSLPC	1965	-		S	1	100,000	100,000
3	Glace Bay	Glace Bay	SPCL	1932	1959	Coal	S	2 4	6,000 15,000	72,000
4	Trenton	Trenton	NSPC	1951	1959	Coal	S	2 2	10,000 20,000	60,000
5	Sydney	Sydney	DOSCO	1919	1943	Coal, oil, gas	S	1 2 1 1	7,600 3,000 5,000 16,000	34,600

No.	Station	Location	Owner	Year Installed		Fuel	Type of Prime Mover	Generators		
				First Unit	Latest Unit			No.	Unit Capacity kw.	Total Capacity kw.
NOVA SCOTIA (Cont'd)										
6	Harrison Lake	Maccan	NSPC	1926	1949	Coal	S	1 1 1 1	15,000 6,250 1,600 4,000	26,850
7	Port Hawkesbury	Point Tupper	NSP	1962	-	Coal	S	1	10,000	10,000
8	Brooklyn	Brooklyn	BMPC	1943	-	Oil, wood-waste	S	1	5,170	5,170
9	Dartmouth	Dartmouth	IOC	1965	-	Oil		1	3,750	3,750
10	King Street	Yarmouth	NSLPC	1937	1948	Oil	IC	1 1 2	320 400 600	1,920
	Total capacity of plants 1,500 kw. and over (not listed above)									5,200
	Total capacity of plants under 1,500 kw.									1,778
	Total (all plants)									488,768

Prince Edward Island

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	Charlottetown	Charlottetown	MEC	1931	1963	Oil	S	1 1 2 1 1	1,500 4,000 7,500 10,000 20,000	50,500
2	Summerside	Summerside	MS	1940	1963	Oil	IC	1 2 1 1 2	200 250 555 1,135 2,250	6,890
	Total capacity of plants 1,500 kw. and over (not listed above)									
	Total capacity of plants under 1,500 kw.									100
	Total (all plants)									57,490

Newfoundland

No.	Station	Location	Owner	First Unit	Latest Unit	Fuel	Type of Prime Mover	No.	Unit Capacity kw.	Total Capacity kw.
1	St. John's	St. John's	NLPC	1957	1959	Oil	S	1 1	10,000 20,000	30,000
2	Grand Falls	Grand Falls	PPP	1930	1931	Oil	S	2	5,000	10,000
3	Tilt Cove	Tilt Cove	TCPC	1960	-	Oil	S	1	5,000	5,000
4	Wabush Lake	Wabush Lake	WM		1963	Oil	IC	4	1,000	4,000
5	Labrador City	Carol Lake	IOCC			Oil				3,910
6	Gander (Stand-by)	Gander	DOT	1948	1962	Oil	IC	3	1,000	3,000
7	St. John's	St. John's	NLPC	1956	-	Oil	IC	1	2,500	2,500
8	Port aux Basques	Port aux Basques	WCPC	1945	1964	Oil	IC	3 2 1 1	350 250 85 300	1,935
9	Salt Pond	Salt Pond	UTEC	1964	1964	Oil	IC	3	500	1,500
	Total capacity of plants 1,500 kw. and over (not listed above)									4,000
	Total capacity of plants under 1,500 kw.									9,392
	Total (all plants)									75,237

Canada (TOTAL THERMAL CAPACITY) 7,602,033

IC - Internal Combustion, S - Steam

OWNER CODE INDEX

This index provides an explanation of the code letters used in the "Owner" column of the preceding tables. The following abbreviations are used for the names of the provinces and territories of Canada:

British Columbia	BC	New Brunswick	NB
Alberta	Alta	Nova Scotia	NS
Saskatchewan	Sask	Prince Edward Island	PEI
Manitoba	Man	Newfoundland	Nfld
Ontario	Ont	Yukon Territory	YT
Québec	Qué	Northwest Territories	NWT

CODE	OWNER	DEVELOPMENTS LOCATED IN
ACL. . . .	Anaconda Company (Canada) Limited.	BC
ACPP. . .	Anglo-Canadian Pulp and Paper Mills Limited.	Qué
AECL. . .	Atomic Energy of Canada Limited.	Ont
AL.	Ayers Limited	Qué
ALCAN. .	Aluminum Company of Canada Limited.	BC, Qué
APPC. . .	Abitibi Power and Paper Company Limited.	Ont
ASC	Algoma Steel Corporation Limited.	Ont
ASR	Atlantic Sugar Refineries.	NB
ASRC . . .	American Smelting and Refining Company Limited	Nfld
BA.	British American Oil Company.	Alta
BCFP. . .	British Columbia Forests Products Limited	BC
BCHPA. .	British Columbia Hydro and Power Authority	BC
BCSRC. .	British Columbia Sugar Refining Company Limited. . . .	BC
BMPC . .	Bowaters Mersey Paper Company Limited	NS
BNE. . . .	British Newfoundland Exploration Limited	Nfld
BPC. . . .	Bowater Power Company Limited	Nfld
BPPC. . .	Bathurst Power and Paper Company Limited.	NB
BRMC . .	Brunner Mond Canada Limited	Ont
CAC. . . .	Cassiar Asbestos Corporation Limited.	BC
CC.	City of Campbellton	NB
CCC. . . .	Columbia Cellulose Company Limited	BC
CCCC. . .	Continental Can Company of Canada Limited	Ont
CCCL. . .	Canadian Chemical Company Limited.	Alta
CCL. . . .	Canadian Celanese Limited	Qué
CDSC . . .	Canada Dominion Sugar Company Limited.	Ont, Qué
CE.	City of Edmonton	Alta
CFP. . . .	Canadian Forest Products Limited	BC
CGEC. . .	Canadian General Electric Company Limited.	Ont
CGQM . .	Cariboo Gold Quartz Mining Company Limited.	BC
CIPC . . .	Canadian International Paper Company.	Qué
CL.	City of Lethbridge	Alta
CMH . . .	City of Medicine Hat.	Alta
CMSC. . .	Consolidated Mining and Smelting Co. of Canada Ltd. . .	Sask, BC, NWT
CN.	City of Nelson	BC
CNPC. . .	Canadian Niagara Power Company Limited.	Ont
COR. . . .	City of Revelstoke	BC
CP.	Calgary Power Ltd.	Alta
CPUC. . .	Campbellford Public Utilities Commission	Ont
CRL. . . .	City of Rivière-du-Loup	Qué
CRPC. . .	Churchill River Power Company.	Sask
CS.	City of Sherbrooke	Qué
CSF	Canadian Sugar Factories Limited.	Alta
CTMC . .	Canada Tungsten Mining Corporation Limited	NWT
CU.	Canadian Utilities Limited.	Alta
CZB. . . .	Crown Zellerbach Building Materials Limited.	BC
CZC. . . .	Crown Zellerbach Canada Limited.	BC
DOSCO. .	Dominion Iron and Steel Company Limited	NS
DOT. . . .	Department of Transport, Government of Canada	Nfld
DP.	Donnacona Paper Company.	Qué
DPC. . . .	Dryden Paper Company Limited	Ont
DPP. . . .	Domtar Pulp and Paper Company Limited.	Qué
DPW . . .	Department of Public Works, Government of Alberta. . .	Alta
DT.	Dominion Tar and Chemical Company	Qué
DTC. . . .	Dominion Textile Company Limited.	Qué

CODE	OWNER	DEVELOPMENTS LOCATED IN
EBEC. . .	E. B. Eddy Company	Ont, Qué
EKPC. ...	East Kootenay Power Company Limited	Alta, BC
ELS. . . .	Eagle Lake Sawmills Company Limited	BC
EM	Endako Mines Limited.	BC
EML . . .	Électrique de Mont Laurier Limitée	Qué
EMR . . .	Eldorado Mining and Refining Limited	NWT, Sask
ERC. . . .	Electric Reduction Company.	Qué
FC.	Fraser Companies Limited	NB
FMCC . .	Ford Motor Company of Canada Limited.	Ont
FMMC . .	First Maritime Mining Corporation.	Nfld
FMP . . .	Fort McMurray Power Company Limited	Alta
GCM . . .	Gaspé Copper Mines Limited	Qué
GELW . .	Gananoque Electric Light and Water Supply Co. Ltd. . .	Ont
GLPC. . .	Great Lakes Power Corporation Limited	Ont
GM	Granduc Mines Limited.	BC
GPC. . . .	Gull Power Company.	Qué
GPP. . . .	Gaspesia Pulp and Paper Company Limited.	Qué
GTR. . . .	Goodyear Tire and Rubber Company Limited.	Ont
HBMS. . .	Hudson Bay Mining and Smelting Company Limited. . . .	Sask
HCL. . . .	Huronian Company Limited	Ont
HEPCO. .	Hydro-Electric Power Commission of Ontario.	Ont
HJP	Hart Jaune Power Company	Qué
HLC. . . .	Hillcrest Lumber Company Limited.	BC
HWS. . . .	Hiram Walker and Sons Limited	Ont
INCO . . .	International Nickel Company of Canada Limited	Man
IOCC . . .	Iron Ore Company of Canada	Qué, Nfld
IOL	Imperial Oil Limited.	NS
IPP	Irving Pulp and Paper Limited	NB
JIOC . . .	Jedway Iron Ore Company Limited	BC
JMC. . . .	James MacLaren Company Limited.	Qué
KC.	Kalium Chemicals Limited.	Sask
KVPC. . .	Kalamazoo Vegetable Parchment Company Limited . . .	Ont
LMC . . .	Lorraine Mining Company Limited	Qué
MBPP . .	Minas Basin Pulp and Power Company.	NS
MBPR . .	MacMillan Bloedel and Powell River Limited	BC
MCC . . .	Marathon Corporation of Canada.	Ont
MCL . . .	Mohawk Corporation Limited	Qué
ME	Municipality of Edmunston	NB
MEC . . .	Maritime Electric Company Limited	PEI
MFLC . .	McFadden Lumber Co. (Domtar).	Ont
MH	Manitoba Hydro	Man
MJ.	Municipality of Jonquière.	Qué
MNBP . .	Maine and New Brunswick Electrical Power Co. Ltd. . .	NB
MP	Manicouagan Power Company.	Qué
MQPC . .	MacLaren-Québec Power Company	Qué
MS.	Municipality of Summerside.	PEI
MSC. . . .	Manitoba Sugar Company Limited	Man
NBEPC. .	New Brunswick Electric Power Commission.	NB
NBIPC . .	New Brunswick International Paper Company Limited. .	NB

CODE	OWNER	DEVELOPMENTS LOCATED IN
NCPC. . .	Northern Canada Power Commission.	YT, NWT
NHB. . . .	National Harbours Board, Government of Canada	Man
NLPC. . .	Newfoundland Light and Power Company Limited.	Nfld
NM	Noranda Mines Limited.	Qué
NRC. . . .	National Research Council, Government of Canada	Ont
NSLPC . .	Nova Scotia Light and Power Company Limited	NS
NSP. . . .	Nova Scotia Pulp Limited.	NS
NSPC . . .	Nova Scotia Power Commission	NS
NU.	Northland Utilities Limited	Alta
NWPP . .	North Western Pulp and Power Limited	Alta
OFM . . .	Ogilvie Flour Mills.	Qué
OHEC. . .	Ottawa Hydro-Electric Commission.	Ont
OMPP . .	Ontario-Minnesota Pulp and Paper Company Limited . .	Ont
OPC. . . .	Ontario Paper Company.	Ont
OVPC. . .	Ottawa Valley Power Company	Qué
OWLP . .	Orillia Water Light and Power Commission	Ont
PAPC. . .	Pan American Petroleum Corporation	Alta
PAPUC. .	Port Arthur Public Utilities Commission	Ont
PBC. . . .	Price Brothers and Company Limited	Qué
PC.	Polymer Corporation	Ont
PELC. . .	Pembroke Electric Light Company Limited.	Qué, Ont
PHPC. . .	Peterborough Hydraulic Power Company	Ont
PP.	Pacific Petroleum Company Limited	BC
PPP. . . .	Price (Nfld) Pulp and Paper Limited	Nfld
QCMC . .	Québec Cartier Mining Company.	Qué
QHEC. . .	Québec Hydro-Electric Commission	Qué
QNSPC . .	Québec-North Shore Paper Company	Qué
RC.	Rayonier Canada (BC) Limited	BC
REC. . . .	Romaine Electric Company Limited.	Qué
SAPC . . .	Ste. Anne Paper Company Limited.	Qué
SCC. . . .	Steel Company of Canada Limited	Ont
SFPPC . .	Spruce Falls Power and Paper Company.	Ont
SGM. . . .	Sherritt-Gordon Mines Limited.	Man, Alta
SMPC. . .	Smelter Power Corporation	Qué
SMS. . . .	S. M. Simpson Limited	BC
SP	Strathcona Paper Company Limited	Ont
SPC	Saskatchewan Power Corporation	Sask
SPCL . . .	Seaboard Power Corporation Limited.	NS
STLSA . .	St. Lawrence Seaway Authority	Ont
TCPC. . .	Tilt Cove Power Corporation	Nfld
TFPC. . .	Twin Falls Power Company Limited	Nfld
TPPC. . .	Thurso Pulp and Paper Company.	Qué
UELPC. .	Union Electric Light and Power Company	Nfld
UTEC. . .	United Towns Electric Company Limited	Nfld
WC	Western Chemicals Limited.	Alta
WCPC . .	West Coast Power Company Limited	Nfld
WFI. . . .	Western Forest Industries Limited	BC
WH	Winnipeg Hydro	Man
WKPL . .	West Kootenay Power and Light Company Limited	BC
WM	Wabush Mines	Nfld
YCGC. . .	Yukon Consolidated Gold Corporation.	YT


LEGEND
TRANSMISSION LINES
EXISTING
UNDER CONSTRUCTION
66 KV - 199 KV
200 KV - 299 KV
300 KV - 399 KV
400 KV AND OVER
GENERATING STATIONS
HYDRO-ELECTRIC
THERMAL-ELECTRIC
NOTE ONLY STATIONS WITH TOTAL INSTALLED GENERATING CAPACITIES OF NOT LESS THAN 1,500 KW ARE SHOWN
TERRITORIES
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
WATER RESOURCES BRANCH
CANADA
MAIN ELECTRIC TRANSMISSION SYSTEMS
AND
PRINCIPAL POWER GENERATING STATIONS
SCALE OF MILES
100
50
0
100
200
STATUTE MILES
KILOMETRES
DECEMBER 1965